NOTE

This Microfiche meets the quality requirements of the American National Standard for Microfiche of Documents (ANSI PH5.9-1975). However, because of imperfections in the document from which it was made, it contains images that are illegible or difficult to read. The source document for this microfiche is the best copy that could be obtained prior to filming.

Congressional Information Service, Inc.
Washington, D.C.
CIS

DEPARTMENT OF ENERGY FISCAL YEAR 1983 AUTHORIZATION
(Conservation Programs)

HEARING

BEFORE THE

SUBCOMMITTEE ON
ENERGY CONSERVATION AND SUPPLY

OF THE

COMMITTEE ON
ENERGY AND NATURAL RESOURCES
UNITED STATES SENATE

NINETY-SEVENTH CONGRESS

SECOND SESSION

TO

REVIEW THE DEPARTMENT OF ENERGY'S FISCAL YEAR 1983
BUDGET REQUEST

MARCH 30, 1982

Publication No. 97-71

Printed for the use of the
Committee on Energy and Natural Resources

U.S. GOVERNMENT PRINTING OFFICE
93-313 O WASHINGTON : 1982

S311-30

COMMITTEE ON ENERGY AND NATURAL RESOURCES

JAMES A. McCLURE, Idaho, *Chairman*

MARK O. HATFIELD, Oregon
LOWELL P. WEICKER, Jr., Connecticut
PETE V. DOMENICI, New Mexico
MALCOLM WALLOP, Wyoming
JOHN W. WARNER, Virginia
GORDON J. HUMPHREY, New Hampshire
FRANK H. MURKOWSKI, Alaska
DON NICKLES, Oklahoma
JOHN P. EAST, North Carolina
JOHN HEINZ, Pennsylvania

HENRY M. JACKSON, Washington
J. BENNETT JOHNSTON, Louisiana
DALE BUMPERS, Arkansas
WENDELL H. FORD, Kentucky
HOWARD M. METZENBAUM, Ohio
SPARK M. MATSUNAGA, Hawaii
JOHN MELCHER, Montana
PAUL E. TSONGAS, Massachusetts
BILL BRADLEY, New Jersey

MICHAEL D. HATHAWAY, *Staff Director*
CHARLES A. TRABANDT, *Chief Counsel*
D. MICHAEL HARVEY, *Chief Counsel for the Minority*

SUBCOMMITTEE ON ENERGY CONSERVATION AND SUPPLY

LOWELL P. WEICKER, Jr., Connecticut, *Chairman*

MARK O. HATFIELD, Oregon
GORDON J. HUMPHREY, New Hampshire
JOHN P. EAST, North Carolina
JOHN HEINZ, Pennsylvania

HOWARD M. METZENBAUM, Ohio
SPARK M. MATSUNAGA, Hawaii
PAUL E. TSONGAS, Massachusetts
BILL BRADLEY, New Jersey

JAMES A. McCLURE and HENRY M. JACKSON are Ex Officio Members of the Subcommittee
GARY BARBOUR, *Professional Staff Member*

CONTENTS

STATEMENTS

Page

Gibbons, Dr. John H., Director, Office of Technology Assessment, U.S. Congress, accompanied by Dr. Richard Rowberg, Energy Program Manager, Office of Technology Assessment 487, 490
Hatfield, Hon. Mark O., a U.S. Senator from the State of Oregon 136, 138
Moulton, David H., policy director, Energy Conservation Coalition 528, 530
Percy, Hon. Charles H., a U.S. Senator from the State of Illinois 79, 85
Roddis, Louis H., Jr., Chairman, Energy Research Advisory Board, Department of Energy 256, 259
Tribble, Joseph J., Assistant Secretary for Conservation and Renewable Energy, Department of Energy, accompanied by Dr. Melvin Chiogioji, Director, Office of State and Local Assistance; Robert San Martin, Deputy Assistant Secretary for Renewable Energy; and John Millhone, Director, Building Energy Research and Development 229, 231
Weicker, Hon. Lowell P., Jr., a U.S. Senator from the State of Connecticut 1, 2

SUPPLEMENTARY MATERIALS SUBMITTED FOR THE RECORD

Senator Lowell P. Weicker:

General Accounting Office views on the administration's budget proposals for energy (conservation) and related programs 4
Proposed reorganization of the Department of Energy for fiscal year 1983. 28
Budget summary: Department of Energy conservation and renewable energy programs for 1983 30
Program Activities: DOE State and Local Assistance Programs, 1981 report 39

Senator Charles H. Percy:

March 16, 1982, memorandum: Fiscal years 1982-83 manpower utilization planning from Joseph J. Tribble to Deputy Assistant Secretaries 92
Effects on Investment in Energy Conservation of DOE's Programs and of Market Forces, by Robert C. Marlay 94
Alliance To Save Energy 1981 annual report 107

Senator Mark O. Hatfield:

The Residential Conservation Service: Issues Affecting the Programs Future (EMD-82-70) General Accounting Office March 29, 1982 141
The Effects of the Fiscal Year 1983 Budget, Energy Reorganization, and Program Changes on U.S. Energy Emergency Preparedness (EMD-82-45) General Accounting Office March 9, 1982 166
The Reagan Energy Plan: A Major Power Failure, From a Coalition of Energy, Environmental, Scientific, and Consumer Groups Representing Millions of Americans, March 24, 1982 181

Louis H. Roddis, Jr.:

Federal Energy R. & D. Priorities, report of the Energy Research Advisory Board, November 1981 277
Federal Advisory Committees: An Important Frustration, a report of a Conference on Federal Advisory Committees, June 26-27, 1981 360
Private Sector Participation in Federal Energy R.D. & D. Planning, the National Research Council, National Academy of Sciences 373

Dr. John H. Gibbons:

Energy Efficiency of Buildings in Cities, Summary, Office of Technology Assessment, U.S. Congress, March 1982 501

David H. Moulton:
  Conservation and Solar Energy R. & D. expenditures: An International Comparison prepared for the Department of Energy by DHR, Inc., DOE Contract No. DE-AC01-81CE10097, November 9, 1981 .... Page 573
  March 15, 1982, letter from Robert G. Rabben, Assistant General Counsel for Legislation, DOE, to Hon. Richard L. Ottinger, regarding the fiscal year 1983 budget request 589
  March 4, 1982, memorandum: DOE policy statement on anticipated reduction in force actions from Maxine Savitz, Deputy Assistant Secretary for Conservation to Joseph Tribble, Assistant Secretary for Conservation and Renewable Energy 592
  February 8, 1982, memorandum: BERD staff attrition from John P. Millhone, Director, Building Energy Research Division to Joseph Tribble and Maxine Savitz 593
  January 22, 1982, memorandum: Request to fill vacant position in Office of Energy Systems Research from John J. Brogan, Director, Energy Systems Research, to Joseph Tribble and Maxine Savitz 599
  January 19, 1982, memorandum: Fiscal year 1983 Congressional budget, State and local assistance programs (SLAP) staffing levels from Melvin H. Chiogioji, Director, State and Local Assistance Programs, to Joseph Tribble 601
  December 1, 1981 letter from Dr. Robert L. San Martin, Deputy Assistant Secretary for Renewable Energy, to Joseph Tribble 603

APPENDIX

Additional statements and communications submitted for the record 607

DEPARTMENT OF ENERGY FISCAL YEAR 1983 AUTHORIZATION

(Conservation Programs)

TUESDAY, MARCH 30, 1982

U.S. SENATE,
SUBCOMMITTEE ON CONSERVATION AND SUPPLY,
COMMITTEE ON ENERGY AND NATURAL RESOURCES,
Washington, D.C.

The subcommittee met, pursuant to notice, at 9:05 a.m., in room 3110, Dirksen Office Building, Hon. Lowell P. Weicker, Jr., presiding.

Present: Senators Weicker and Hatfield.

Also present: Gary Barbour, professional staff member; and James T. Bruce, counsel for the minority.

OPENING STATEMENT OF HON. LOWELL P. WEICKER, JR., A U.S. SENATOR FROM THE STATE OF CONNECTICUT

Senator WEICKER. The Energy Conservation and Supply Subcommittee meets this morning to review the Department of Energy's 1983 budget request for conservation programs. This morning I am pleased to welcome Senator Charles Percy who chairs the Subcommittee on Energy, Nuclear Proliferation, and Government Process of the Committee on Governmental Affairs, and I will submit my statement for the record in its entirety.

We are always pleased to have our very good and eloquent friend from Illinois, Senator Percy, with us, and Chuck, why don't you just go ahead and proceed?

[The prepared statement of Senator Weicker follows. Additional material submitted for the record by Senator Weicker includes: General Accounting Office Views on the Administration's Budget Proposals for Energy (Conservation) and Related Programs; Proposed Reorganization of the Department of Energy, fiscal year 1983; Budget Summary—Department of Energy Conservation and Renewable Energy Programs for fiscal year 1983; and Program Activities: DOE State and Local Assistance Programs, 1981 report. Testimony continues on p. 79.]

OPENING STATEMENT OF SENATOR LOWELL WEICKER, JR.
SUB-COMMITTEE ON ENERGY CONSERVATION AND SUPPLY
OF THE COMMITTEE ON ENERGY AND NATURAL RESOURCES
MARCH 30, 1982

GOOD MORNING. THE ENERGY CONSERVATION AND SUPPLY SUB-COMMITTEE MEETS THIS MORNING TO REVIEW THE DEPARTMENT OF ENERGY'S 1983 BUDGET REQUEST FOR CONSERVATION PROGRAMS.

THIS MORNING, I AM PLEASED TO WELCOME SENATOR CHARLES PERCY, WHO CHAIRS THE SUB-COMMITTEE ON ENERGY, NUCLEAR PROLIFERATION, AND GOVERNMENT PROCESS OF THE COMMITTEE ON GOVERNMENTAL AFFAIRS. I ALSO WOULD WELCOME OUR GUESTS: MR. JOSEPH J. TRIBBLE, WHO IS ASSISTANT SECRETARY FOR CONSERVATION AND RENEWABLE RESOURCES AT THE DEPARTMENT OF ENERGY; AND OUR DISTINGUISHED PANEL OF CONSERVATION EXPERTS FROM THE OFFICE OF TECHNOLOGY ASSESSMENT, THE ENERGY ADVISORY RESEARCH BOARD, AND THE ENERGY CONSERVATION COALITION.

TODAY'S HEARING WILL FOCUS ON A VERY SMALL BUDGET---A $ 22MILLION BUDGET WHICH HAS BEEN RECOMMENDED BY THE ADMINISTRATION TO FUND ENERGY CONSERVATION PROGRAMS FOR 1983. SPECIFICALLY, THE BUDGET PROVIDES $17.5 MILLION FOR MULTI-SECTOR CONSERVATION RESEARCH AND DEVELOPMENT PROGRAMS AND $ 4.3 MILLION FOR STATE AND LOCAL PROGRAMS. THIS SMALL BUDGET REPRESENTS 1/5% OF THE TOTAL ENERGY BUDGET REQUESTED BY THE DEPARTMENT OF ENERGY, $ 11.8 BILLION. FOR THE PURPOSES OF THIS SUB-COMMITTEE, HOWEVER, IT IS OUR DUTY TO REVIEW THE DIMINUATION OF CONSERVATION PROGRAMS. THIS YEAR'S RECOMMENDATION IS A 97% REDUCTION FROM 1981 APPROPRIATIONS LEVEL, $ 821 MILLION. WE ARE WITNESSING NOT JUST A DISPROPORTIONATE BUDGET REDUCTION, BUT A DEFACTO TERMINATION OF THE FEDERAL ROLE IN CONSERVATION POLICY .

PRIOR TO 1973 THIS NATION HAD LITTLE OR NO EXPERIENCE WITH ENERGY EFFICIENCY OR IMPLEMENTING A NATIONAL ENERGY POLICY. THE OPEC OIL EMBARGO UNCOVERED THE ACHILLES HEEL OF OUR NATION: A FIRMLY ENTRENCHED DEPENDENCE ON IMPORTED OIL. CONSERVATION POLICY, THEREFORE, STARTED FROM THE GROUND UP. INEVITABLY PROGRAMS HAVE OVERLAPPED OR NOT BEEN EFFECTIVE. BUT FOR A SHORT TIME, THIS NATION ENJOYED A COMMITMENT TO DEVELOPING EFFECTIVE CONSERVATION PROGRAMS. DECONTROL OF OIL HAS BEEN AN INTEGRAL PART OF OUR DECREASE IN OPEC OIL IMPORTS. YET, WE HAVE ONLY TAPPED THE SURFACE OF MAKING OUR INFRASTRUCTURE MORE ENERGY EFFICIENT. HIGHER PRICES HAVE SPURRED CONSERVATION, FOR THOSE WHO ARE ABLE TO INVEST THE INITIAL CAPITAL. YET, HIGHER PRICES HAVE ALSO LEFT A SEGMENT OF OUR SOCIETY, THE ELDERLY, THE POOR, THE HANDICAPPED, TO CHOOSE BETWEEN FUEL AND FOOD. TODAY'S GOVERNMENT IS WILLING TO PROVIDE FUEL ASSISTANCE PAYMENTS, BUT IS UNWILLING TO MAKE A SERIOUS INVESTMENT IN WEATHERIZATION.

CONSERVATION MUST BE NATIONAL ENERGY POLICY WHICH TRANSCENDS ALL SECTORS OF SOCIETY. THE ADMINISTRATION'S SEVERE CUTS IN THE BUDGET FOR ENERGY CONSERVATION REFLECT A SINGULAR BELIEF THAT THE FREE MARKET ALONE WILL BE INCENTIVE ENOUGH FOR CONSERVATION. I FEAR THAT BELOW THIS PHILOSOPHY LIES AN ILLUSION THAT SOMEDAY SOON WE CAN RETURN TO A PRE-1973 ERA OF CHEAP, PLENTIFUL ENERGY. ON THE CONTRARY, THIS NATION MORE THAN EVER NEEDS TO MAKE SERIOUS COMMITMENTS TO A CONSISTENT CONSERVATION POLICY.

UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

ENERGY AND MINERALS
DIVISION

9 MAR 1982

Mr. Gary C. Barbour
Staff Director, Subcommittee on Energy
Conservation and Supply
Committee on Energy and Natural Resources
United States Senate

Dear Mr. Barbour:

The enclosed document was prepared by the Energy and Minerals Division of the U.S. General Accounting Office to aid energy-related committees of the Congress in evaluating the President's fiscal year 1983 budget proposals. It provides our views on selected energy-related proposals set forth in the OMB report, "Major Themes and Additional Budget Details." In addition, views are provided on other energy budget proposals where our work was identified as being particularly relevant to this year's congressional budget process. In a separate transmittal, the Chairman and Ranking Minority Member of the full committee were provided a document that gives GAO's overall views on energy and non-energy budget proposals within the committee's jurisdiction.

For your convenience in obtaining additional information on the basis of our views, we have referenced each discussion to our issued reports and have provided the phone number of a contact person who can provide additional details as desired. The last two pages of the document contain information on the quickest way to obtain copies of any referenced report, and a complete telephone listing of key GAO energy representatives.

Presently, the Energy and Minerals Division has over 80 assignments ongoing. Many are being conducted in direct response to a congressional committee's request and relate to one or more of the administration's proposals. If you or your staff would like to be briefed on our work, or have any questions about any of the areas discussed in this document, please contact me or any of the listed contact people.

Sincerely yours,

J. Dexter Peach
Director

Enclosure

5

GAO VIEWS ON THE ADMINISTRATION'S BUDGET PROPOSALS FOR ENERGY AND RELATED PROGRAMS

CONTENTS

	Page
Overall Issues	1
Budget Proposals Supporting the Major Themes of the Administration	5
Non-Nuclear Energy Research and Development	5
Fossil Energy R&D	5
Solar Energy	7
Geothermal Energy	9
Energy Storage R&D	11
Alcohol Fuels R&D	12
Solar Energy and Energy Conservation Bank	13
Nuclear Energy Programs	15
Water-Cooled Breeder Program	15
Light Water Reactor Extended Burnup Program	16
Nuclear Spent Fuel Storage	17
Uranium Enrichment Revenues	18
Remedial Actions to Clean-up and Decommission Nuclear Facilities/Sites	20
Dismantlement of the Department of Energy	21
Additional Energy Budget Comments	23
Energy Conservation	23
Schools and Hospitals Grant Program	23
The Residential Conservation Service and Energy Extension Service	24
Low Income Weatherization Assistance	25
Building and Appliance Standards	27
Internal Federal Government Conservation Efforts Federal Energy Management Program	28

	Page
Energy Emergency Preparedness	29
Energy Emergency Preparedness Program	29
Strategic Petroleum Reserve	32
Electric System Emergency Preparedness	33
Federal Resources Management	34
OCS Leasing Program	34
Proposed Transfer of Leasing Policy to the Department of the Interior	35
Naval Petroleum Reserves	36
Energy Regulation and Information	37
Petroleum Regulatory Activities	37
Coal Switching	38
Utility Programs	39
Energy Information	40
How to Obtain Copies of GAO Reports	41
Listing of Key GAO Energy Representatives	42

Solar Energy

The administration proposes to further reduce Federal solar R&D efforts. In recent years, GAO has issued a number of reports on the Federal role in developing various solar energy technologies. Based on these reports and ongoing work, GAO believes that a determination of the extent of each solar technology's readiness for the marketplace is needed in deciding appropriate levels of Federal solar R&D.

The administration's fiscal year 1983 budget request proposes to reduce funds for solar energy R&D by 72 percent, to $72 million. The administration intends to place greater reliance upon private industry, the marketplace, and existing tax credits, to determine the appropriate level of solar development and use. Thus, Federal R&D support for developing certain technologies has been significantly reduced, and for certain technologies that support is proposed for elimination entirely.

GAO is concerned that the proposed reductions are not based on a full knowledge of the marketplace's expected reaction. Eliminating Federal support for some solar technologies, such as active and passive solar space heating and solar hot water systems, seems appropriate. Such systems are cost-competitive today in certain parts of the country with the continuation of tax incentives, and with increasing costs of conventional fuels these systems should continue to move into the marketplace. However, a number of other solar technologies are not sufficiently close to being economically competitive and, with reduced or no Federal support, their further development will either proceed at a slower pace until costs can be reduced or they may be abandoned altogether.

One technology that will probably develop more slowly with reduced Federal support is solar photovoltaics. Recent GAO work indicates that industry is reluctant to make additional investments due to the high uncertainties and risks associated with making this technology economical. Consequently, the widespread use of photovoltaic energy systems will likely be delayed.

Other solar technologies may need costly, large-scale development to prove their potential and, without Federal support, industry's efforts may be dropped before such potential is determined. Ocean thermal energy conversion systems (OTEC) represents a case in point. In a report on OTEC, GAO noted that alternative systems and components were still in the research phase and involve long-term, high-risk research not likely to receive substantial support from private firms.

A sizable Federal investment amounting to about $2 billion has been made to date in developing the various solar technologies. Before reducing the Federal role in solar energy development, a case-by-case examination of each technology's degree of readiness for the marketplace should be made to understand clearly the likely marketplace reaction to reduced Federal support.

Relevant GAO Reports. EMD-79-55, EMD-73-40, EMD-80-41, EMD-79-19, EMD-81-10, EMD-81-62, and ID-81-63

GAO Contact. Thomas E. Melloy - 353-5720

Geothermal Energy

The administration proposes to support long-term geothermal R&D which will not be conducted by the private sector, to terminate hydrothermal industrialization activities, and to complete Federal geopressured resource definition efforts. Based on past and ongoing work, GAO has some views on these proposals.

GAO reported in January 1980 that geothermal development had proceeded slowly and private industry's efforts had primarily focused on high quality hydrothermal resources. Industry had made only limited efforts to develop other resource areas due to the high costs, financial risks, and lack of proven technology for defining, extracting, and using most of the recoverable resources for electric applications. DOE's technology development efforts have resulted in some cost reductions, but have not yet sufficiently reduced the costs and risks involved to the point where industry would make significant investments. GAO believes the administration's proposal to continue support of long-term R&D--geochemistry, geoscience, and energy conversion research associated with moderate temperature hydrothermal resources--is in line with the technology advancements and improvements still needed.

Information gathered by GAO indicates, however, that without Government support of carefully selected hydrothermal demonstration activities, economic and technical uncertainties will remain, particularly with respect to the major portion of high-temperature resources. A case in point is the 50-megawatt binary demonstration plant at Heber, California. The administration's budget proposals for fiscal year 1982 had called for the termination of Federal funding of this project. During its budget deliberations, however, the Congress provided about $8.6 million to keep the project going. Nevertheless, the administration's proposals for fiscal year 1983 again call for terminating Federal funding of the Heber project. The current proposals, while not specifically stating why Federal funding of this project is being terminated, point out that industrial capability is currently available to develop the most easily exploitable high-temperature resources, and that certain hydrothermal applications are currently cheaper than other energy alternatives. GAO reported in June 1981 that elimination of this demonstration project would impede the full development and use of hydrothermal resources. This project is aimed at demonstrating a technology that has not been well developed and is expected to be best suited for the major portion of the high-temperature hydrothermal resources in the United States. According to industry representatives, this demonstration project is needed to prove the technical and economic viability of the binary technology. Without a demonstration, the growth of geothermal energy will be slowed, since developers, utilities, and the financial community will not undertake development until operating information is gained from commercial-size demonstrations.

Energy Storage R&D

The administration has proposed to close out the energy storage R&D program in fiscal year 1983, including efforts on long-term, high-risk battery projects. It has, however, proposed to provide about $7 million for basic research on electrochemistry and related fields, as well as for development of several near-term battery candidates as part of a multi-purpose conservation R&D program. Although GAO has only done limited work on DOE's energy storage program, based on previous and ongoing reviews of electric vehicles, GAO is concerned with some aspects of the administration's proposal since it would fund work on batteries which are, or close to being, commercial at the expense of work on long-term, advanced batteries.

For electric vehicles to become a widely commercialized, general purpose transportation option, long-term, advanced batteries, such as aluminum-air, lithiummetal-sulfide, or sodium-sulfide, will probably be required. In fiscal year 1983, work on these batteries is to be closed out. Because the battery candidates involved are long-term and high-risk in nature, the private sector is highly unlikely to develop them, thus jeopardizing the progress already made through Federal efforts. Moreover, a portion of the proposed $7 million of fiscal year 1983 funding is for developing near-term batteries, namely lead-acid and nickel-iron. Lead-acid batteries have been commercial for years and nickel-iron batteries are being earnestly pursued by the battery industry. Federal funding of near-term battery candidates, while discontinuing funding for long-term advanced batteries, seems to run contrary to the administration's basic R&D philosophy. GAO believes, therefore, that Federal R&D on long-term advanced battery candidates should continue while the proposed funding of near-term batteries does not appear appropriate.

Relevant GAO Report. EMD-79-6

GAO Contact. Thomas E. Melloy - 353-5720

Alcohol Fuels R&D

The administration proposes to phase out alcohol fuels R&D under the assumption that the technologies involved have reached the stage where the private sector can, over time, pursue further technological advancements. Based on past work on Federal alcohol fuels efforts, GAO questions this assumption.

In commenting on fiscal year 1982 budget proposals, GAO generally agreed with the administration's proposals to reduce Federal alcohol fuels subsidies for three principal reasons. First, ethanol production is commercial, as evidenced by over 100 million gallons being domestically sold each year. Second, existing tax policies and the removal of oil price controls enhance the economic competitiveness of alcohol fuels and hence the ability of private firms to continue technological improvements. Third, the majority of Federal alcohol fuels support activities have concerned the production and use of biomass-based alcohol (primarily ethanol), although another form of alcohol (methanol) has greater potential to replace gasoline. Therefore, excessive support for ethanol production and use could result in an economically unjustified commitment of resources to ethanol.

While agreeing with the reductions proposed last year, GAO has some concerns about this year's proposal. In FY 1982 the administration proposed and received $10 million for alcohol fuels R&D. The R&D supported with these funds was described as "focused on mid- to long-term, novel, high-risk and high-payoff technologies." In its fiscal year 1983 budget proposal, the administration is now proposing to phase-out these efforts, asserting that the technologies are at a stage where the private sector can pursue advancements. GAO has not analyzed the development of the technologies involved in detail, but it is highly questionable that in 1 year the technologies were advanced from "long-term" R&D to a stage where the private sector can pursue developments without Federal support. At a minimum, such an assertion casts doubt on the credibility and consistency of the administration's decisionmaking process. It also does not address the issue that the technologies may not be further developed by the private sector alone without additional Federal support.

Relevant GAO Reports. EMD-80-73, EMD-80-88

GAO Contact. Thomas E. Melloy - 353-5720

SOLAR ENERGY AND ENERGY CONSERVATION BANK

The Solar Energy and Energy Conservation Bank was created by the Energy Security Act (P.L. 96-294, June 30, 1980) to promote the use of solar energy systems and conservation by making grants and subsidized loans to individuals who install solar systems in, or make energy conservation improvements to, residential or commercial buildings. The administration has not requested funds for the bank for fiscal year 1983. Since the Bank has not yet begun operations, GAO has not reviewed its activities. However, based on previous work on solar energy and ongoing work on energy tax credits, GAO, with some reservations, supports the administration's proposal not to now initiate bank operations.

Although the Congress appropriated $121.25 million for fiscal year 1981, and another $22 million for fiscal year 1982, for the Bank to start operations, to date the executive branch has not initiated operations. The administration rescinded, with congressional approval, $121 million of fiscal year 1981 funding and is proposing to rescind all of the fiscal year 1982 funding. The administration's rationale for rescinding fiscal year 1982 funding and keeping the Bank from beginning operations is that market incentives should be relied upon, and subsidy programs that reward a few fortunate home or building owners should be resisted. The administration argues that if the Bank were to begin operations in fiscal year 1982, only about 9,300 individuals would benefit from the Bank's efforts. To place this argument in context, however, GAO notes that a portion of these funds were to be used for starting operations, including bringing staff on-board and carrying out promotional activities.

The basic issue is whether the subsidies to be provided by the Bank are needed. GAO's work to date relative to this issue has not been sufficiently comprehensive to provide any definitive answers. However, GAO's efforts related to tax credits in general and its work in the solar area does provide some useful insights:

--Interest subsidies such as those that would be offered by the Bank may not be as effective an incentive as energy tax credits for aiding the commercialization of solar heating.

--The act creating the Bank precludes an individual taxpayer from receiving benefits of both interest subsidies and the currently allowed tax credits.

--The Windfall Profits Tax Act of 1980 (P.L. 96-223, April 2, 1980) provided a 40 percent solar energy tax credit for residential use of solar energy systems. On the surface, it appears that individuals would opt for the tax credits since interest subsidies would result in a much smaller dollar benefit.

While GAO's efforts would seem to point in the direction that the Bank's subsidies could have limited usefulness, GAO cautions that more analysis remains to be done in the conservation area as well as solar energy relative to this issue. GAO notes, for example, that the full impact of the 40 percent solar tax credit--because of its relative newness--is not yet known and may not be known for some time.

Relevant GAO Report. EMD-79-19

GAO Contact. Thomas E. Melloy - 353-5720

DISMANTLEMENT OF DOE

The proposal to reorganize Federal energy activities is, according to the administration, the culmination of a process to place more reliance on the private sector. This process includes sharp budget reductions for many energy programs and the transfer of energy program responsibilities to other agencies. Energy research and development activities would be carried out within the Department of Commerce by a new organization, an Energy Research and Technology Administration. The Strategic Petroleum Reserve operations, the Naval Petroleum Reserve, and the Power Marketing Administrations would be transferred to the Department of Interior. The Department of Justice would become responsible for completing enforcement legislation responsibilities, and the Federal Energy Regulatory Commission would become an independent regulatory agency.

Energy is a serious, long-term problem with important implications for security, the economy, our quality of life, and international coordination. Despite some progress, the U.S. remains dependent on expensive and unreliable oil imports. Further energy progress will depend upon a coordinated approach designed to effect long-term solutions which reduce U.S. reliance on insecure sources of imported oil. Therefore, although GAO agrees that reducing Federal regulation and increasing reliance on the private sector are worthy goals and can help to ameliorate the energy problem, GAO also believes that there is a continuing need for a strong Federal role in key energy areas.

GAO has the following observations on three broad options for managing Federal programs.

--The proposal to disperse DOE programs and responsibilities should be examined with particular emphasis on the effects such changes would have on program management and decisionmaking. In addition, given the need for coordination for energy programs, particularly in the case of possible future energy emergencies, information should be sought and careful attention paid to ways in which such coordination would take place. In summary, the dismantling option raises a number of questions about program coordination which require analysis.

--The option of keeping existing energy programs together and reducing them to sub-Cabinet status obviously does not raise the same issues of energy program coordination. The principal point of focus in examining this option is whether the reduced stature is appropriate given the long term nature and other national and international implications of energy issues.

--The option of retaining Cabinet-level status for energy would provide a focus on the energy problem, help ensure that sufficient emphasis and visibility is directed toward the problem, and provide the opportunity for energy issues to be considered at the highest levels of the Government. It would also demonstrate to foreign nations this Nation's commitment to solving the problem and asure that international energy efforts are coordinated.

In addition, the cost savings or increases which are attributable to each option are factors to consider in weighing reorganization proposals.

In examining organizational options, one must recognize the inherent difficulties of defining right or wrong. Over the years, GAO has identified serious program management and decisionmaking problems both before and after DOE became the centralized Federal energy agency. Organizational changes will not necessarily solve management problems. Ultimately, choosing among the organizational options requires congressional exercise of political and value judgments about the nature of the energy problem; the "best" organizational structure; the stature, visibility and prestige energy merits; and the practicality of fundamental changes in energy organization structure at this time.

Relevant GAO Report. EMD-82-21

GAO Contact. Edward Kratzer - 376-9713

ENERGY CONSERVATION

Schools and Hospitals Grant Program

The administration proposes to completely terminate funding in FY 1983 for the Schools and Hospitals Program. This is a reversal of its position in FY 1982 when the Schools and Hospitals Program was singled out as needing Federal support. GAO's work has indicated that there are a substantial number of institutions which could benefit from energy audits under this program, with resultant energy savings.

In its fiscal year 1982 budget request, the administration noted that schools and hospitals were large consumers of energy, and as such, faced severe financial burdens because of rising energy prices. It also stated that market forces are slow to affect this sector since most school and hospital operating funds come from tax revenues (property taxes, medicare, medicaid, etc.) and these institutions do not benefit from tax incentives.

In its fiscal year 1983 justification, however, the administration states that there is clear evidence that the market place has responded favorably to higher energy prices and that public awareness of energy conservation benefits and the high level of private investment in energy conservation clearly show that the State/local grant programs should not be continued.

GAO's 1981 report on the Schools and Hospitals Program noted that a substantial number of institutions which could benefit from energy audits under the program had not received them. Such audits at other institutions had resulted in identifying energy savings opportunities up to 30 percent. GAO recommended that the program's focus be redirected toward placing more emphasis on energy audits, providing energy audits to more schools and hospitals, and more closely matching the assistance provided to the needs of schools and hospitals.

Relevant GAO Report. EMD-81-47

GAO Contact. William C. Celkers - 252-1400

The Residential Conservation Service and Energy Extension Service

The administration's proposal to abandon the Residential Conservation Service (RCS) is apparently based on the assumption that utilities will respond to consumer needs when conservation represents an economic alternative. Because individual utilities face vastly different demand, supply, and cost situations, however, GAO believes that the administration's strategy could result in a fragmented assortment of residential conservation programs--unequal in application, quality, or comprehensiveness. Ultimately, this strategy could lead to many years of delay in realizing the energy conservation potential available.

In a report on residential energy conservation outreach programs, including the Energy Extension Service (EES) and RCS, GAO discussed the contribution such programs made in encouraging residential consumers to conserve energy. GAO concluded that comprehensive site-specific information, delivered on a personal basis, was the most effective means to inform and encourage consumers to voluntarily take energy conservation actions. GAO found that the lack of effective management of these programs at the Federal level had severely diminished their potential impact. GAO also concluded that EES and RCS had the potential to meet such consumer information needs if DOE more effectively managed EES and made RCS the key program in its residential energy conservation outreach strategy.

Relevant GAO Report. EMD-81-6

GAO Contact. William C. Oelkers - 252-1400

Low Income Weatherization Assistance

The administration proposes to terminate DOE's low-income weatherization program and provide emergency financial aid and crisis support through a Department of Health and Human Services (HHS) program. If this latter program does not include a weatherization element, there will no longer be a Federal weatherization effort. Even if it retains a weatherization element, it could be limited by a ceiling on eligible weatherization measures. If it is so limited, GAO believes that the program won't provide the coverage DOE's program would provide and is not likely to be as effective in reducing energy costs.

Pursuant to specific legislative mandate, GAO has issued three reports on DOE's low-income weatherization program. In an October 1981 report, GAO reported that although weatherization production increased in 1980, the outlook for maintaining a high level beyond 1981 was doubtful because of budget reductions and increased cost per unit due to more reliance on contract services to do weatherization work. GAO also reported that the program has been hampered by poor workmanship, inadequate energy savings data, and inadequate financial management and program monitoring.

GAO concluded, however, that a successful low-income weatherization program could go a long way toward reducing the energy bills of low-income households--estimated at about 12 million. Also, a successful program could reduce the costs of the Low-Income Home Energy Assistance Program, which received funding in FY 1982 of about $1.8 billion to provide grants to States for assistance to low-income persons for payment of home energy costs.

The Low-Income Home Energy Assistance Program, which is administered by HHS, permits each State to use up to 15 percent of its allotment for low-cost residential weatherization or other energy-related home repairs for low-income households. In the FY 1983 budget, the administration proposes merging the HHS energy assistance program with another HHS program providing emergency financial aid and crisis support. Funding of $1.3 billion (vs. $1.8 billion in FY 1982) is proposed for the merged programs.

If the DOE low-income weatherization program is terminated as proposed by the administration and the HHS program retains its weatherization element, it will be the sole remaining Federal program providing low-income weatherization assistance. However, under the existing HHS program, weatherization is limited to "low-cost" measures, whereas under the DOE program up to $1,600 per unit can be expended for weatherization. Therefore, if the proposed HHS program is similarly limited, the program is not likely to be as effective as the DOE program in reducing energy costs.

Relevant GAO Reports. EMD-78-81, EMD-80-59, EMD-82-2

GAO Contact. William C. Oelkers - 252-1400

Building and Appliance Standards

No funds are provided for building or appliance standards in FY 1983.

GAO believes that a Building Energy Performance Standards Program could close the gap between cost effective energy conservation opportunities and the level of energy conservation achieved by market forces. Such a gap exists because of imperfections in the market. For example, consumers do not have precise knowledge of how future energy prices should affect current energy conservation decisions or what energy conservation actions are needed to maximize cost effectiveness. GAO has reviewed the program, and while a mandatory standard may not be justified, establishing a voluntary standard could facilitate market forces by identifying the optimal level of energy conservation that could be cost effectively achieved. DOE indicated that it was in the process of implementing a voluntary building energy performance standards program. It is unclear at this time as to whether such efforts can be completed without funding.

Beginning in 1978, DOE engaged a number of consulting firms to work on the preparation of appliance efficiency standards and the analyses which would support them. Since that time, DOE has completed three separate analyses to support a final rule on appliance efficiency standards. The analyses have resulted in significantly different estimates of the impact appliance efficiency standards could have in achieving energy conservation. As such, questions have been raised by the Congress and the public about the basis for the three DOE analyses. DOE plans to terminate its appliance standards effort. Based on the results of GAO work soon to be completed, it does not appear that DOE has an adequate basis for such termination.

Relevant GAO Reports. EMD-81-2, EMD-81-122, EMD-82-33

GAO Contact. William C. Oelkers - 252-1400.

INTERNAL FEDERAL GOVERNMENT CONSERVATION EFFORTS

Federal Energy Management Program

The administration proposes to terminate funding for the Federal Energy Management Program (FEMP). GAO believes this proposal is unwise not only from an energy conservation standpoint, but also because a strong program can help reduce the Federal Government's energy costs.

In the FY 1982 budget, the administration requested $1.0 million for the program and stated that this internal conservation effort would be retained. However, in the FY 1983 submission no funds are being requested and the program is proposed for termination. This means that all efforts to develop and carry out a comprehensive energy conservation program, including data collection, Federal buildings conservation plans, and overall coordination and leadership for the Nation's largest single energy user will be abolished.

The Federal Government spent almost $9 billion in FY 1980 for energy--approximately 2.2 percent of total national energy use. Federal energy use has declined since 1975, but recent trends show it is on the rise. For the first 3 quarters of FY 1981, energy use increased 4.4 percent above the same period for FY 1980. Identifying cost effective conservation opportunities nationwide and taking necessary corrective measures could result in substantial savings. For example, a one-percent decrease in consumption could save about $90 million.

Numerous GAO reports have concluded that the Federal Government needs to have an aggressive energy conservation program. Yet, many of the legislative and executive order mandates which direct and support an aggressive in-house conservation effort are not being met because of insufficient commitment in the areas of organizational visibility, staffing, and management support.

GAO believes that the Federal Government, as the Nation's largest single energy consumer, needs to have an aggressive energy conservation program. GAO's recent work strongly suggests that problems previously identified in the Federal Government's in-house energy conservation program continue to exist. FEMP has the potential, however, given top management leadership and support at OMB and DOE, to reduce Federal energy consumption and help reduce the Government's $9 billion energy bill.

Relevant GAO Reports. EMD-81-93, EMD-80-11, EMD-79-11, EMD-79-66

GAO Contact. William C. Oelkers - 252-1400.

FEDERAL RESOURCES MANAGEMENT

OCS Leasing Program

In July 1981, the Administration announced a proposed new 5-year offshore oil and gas leasing program designed to accelerate the leasing and inventorying of offshore lands for hydrocarbons. Under the proposed program, the Administration plans to hold more sales, offer more land for lease in each sale, and reduce the amount of time required to plan for sales. Revenues to the U.S. Government from offshore leasing and hydrocarbon production are expected to increase substantially as a result of the new program. Fiscal year 1983 revenues are projected to be $16 billion.

GAO supports reasonable efforts to accelerate leasing and development of hydrocarbons on offshore lands. We have made numerous recommendations in past reports to improve the efficiency and effectiveness of the program--many of these have been adopted by the Interior Department. While in favor of the overall thrust of the Administration's proposed program, GAO believes that serious pitfalls exist in implementing the proposed program--particularly the streamlining procedures. Also, we have reservations as to whether the $16 billion revenue projection is a realistic estimate.

In December 1981, GAO reported that Interior's planning for the new program fell short of what is necessary to clearly demonstrate that the new program can be successfully implemented. Specifically, GAO noted that Interior had not (1) detailed how the streamlining procedures were to be implemented in practice, (2) assessed the potential impacts of the program, nor (3) evaluated the Department's capabilities to handle the program. GAO also reported at the same time that the program is being accelerated, the Administration is reducing the staff-years (11 percent), and appropriations (5.6 percent) for the program.

Offshore revenues are projected at $18 billion for the coming fiscal year--a 128 percent increase from 1982. A major factor that will impact on the realization of these revenues is Interior's ability to hold lease sales as planned. In the past, lease sale plans have been frequently disrupted due to litigation brought about by those questioning OCS leasing and development practices. Because of the major changes being made in the program by Secretary Watt, a new round of litigation may emerge once the final program is approved. If this should happen, fiscal year 1983 leasing plans, and the anticipated revenues, may not be realized. Another factor that could impact on revenues, if sales can be held as planned, is industry's valuation of and willingness to lease offered land. Thus far, industry has indicated that it plans to accelerate leasing, however, there seems to be skepticism that the $18 billion is too high an expectation.

Relevant GAO Reports. EMD-81-46, EMD-81-59, EMD-82-26

GAO Contact. Lowell Mininger - 254-6937

ENERGY REGULATION AND INFORMATION

Petroleum Regulatory Activities

The Administration proposes $14 million for the enforcement of oil pricing regulation in 1983. The Administration also proposes to transfer this activity, now the responsibility of the Economic Regulatory Administration, to the Department of Justice. The $14 million represents a reduction of $23 million from the 1982 budget of $37 million. Unfortunately, the formulation of the $14 million budget amount was not the result of a carefully developed plan for bringing the oil pricing enforcement program to a fair and orderly resolution.

Although the 1983 budget can probably be reduced, we are concerned that such a large reduction--over 62 percent--might impair the Government's ability to fairly and effectively phase out the compliance program. Under this program there are a large number of unresolved cases involving billions of dollars in alleged violations. As of October 17, 1981, DOE had a compliance staff of 770. Under the proposed 1983 budget plan, DOE would have to reduce its compliance staff to 280 full time equivalent positions during fiscal year 1983. Considering the lack of progress made by DOE in resolving alleged violations over the past year, particularly in the Crude Reseller Program, affected oil companies could perceive such a staffing reduction as a lack of commitment on the part of the Government to effectively resolve all violations and could cease any attempts to settle with the Government.

As recommended in our March 1981 report (EMD-81-45, Mar. 31, 1981), and again in our follow-up report on this subject which we expect to publish in April 1982, GAO believes that DOE should develop a plan calling for the orderly resolution of all outstanding violations and litigation. GAO believes that the pursuit of fair resolutions is important in the interest of fairness to the companies that did not violate pricing regulations and to those companies that agreed to settle their violations, and that a failure to follow through on these charges could set a dangerous precedent for any future enforcement regulations established to implement Federal laws.

Relevant GAO Reports. EMD-81-45, EMD-82-46

GAO Contact. Gerald Elsken - 376-9710

Energy Information

The administration's budget proposal for energy information collection and analysis continues its general policy of deemphasizing the Federal energy information role. Our specific comments on the budget are based on our involvement in the work of the Professional Audit Review Team (PART), an interagency group created by the Energy Conservation and Production Act to perform an annual performance audit of the Energy Information Administration (EIA). The PART Chairman is appointed by the Comptroller General of the United States.

The administration's fiscal year 1983 budget request of $54.5 million is a $24.4 million, or about a 31 percent, decrease from the fiscal year 1982 appropriation for energy information activities. However, many energy information systems and functions are specifically mandated by the Congress and cannot be carried out with the reduced funding the administration has requested. The adequacy of the budget request, therefore, is dependent on the willingness of the Congress to remove or alter legislative requirements previously imposed on EIA and transferable to the proposed Bureau of Energy Information within the Commerce Department.

Toward this end, the administration has proposed legislation to relieve the energy information agency from several major legal reporting requirements. Known as the "Energy Information Amendments of 1981", the legislation was submitted to the Congress in May 1981 and proposes to reduce operating costs by allowing EIA to obtain, on a confidential basis, statistical information from other Federal agencies. The legislation also calls for eliminating

--the Financial Reporting System,

--quarterly reports to the Congress on domestic reserves and production, imports, and energy inventories,

--a system for tracking and reporting every transaction, sale, exchange, or shipment involving imports of coal and oil, and

--an annual report on coal reserves disclosure.

The Chairman of the Senate Committee on Energy and Natural Resources introduced the bill in the Senate in May 1981. However, no further action has been taken by the Senate. In the House of Representatives no legislative action has been taken or is currently planned.

Relevant Reports. Draft PART report on EIA Activities, scheduled to be issued in April 1982.

GAO Contact. Ed Kratzer - 376-9713

HOW TO OBTAIN GAO REPORTS

For congressional offices:

Congressional offices requesting copies of GAO reports should call the Office of Congressional Relations at 275-5388 and provide the report reference number and date of issue, or the title, or send a written list to:

Research Assistant
Office of Congressional Relations
Room 7014
U.S. General Accounting Office
441 G Street, N.W.
Washington, D.C. 20548

For all outside GAO requests:

Request for copies of GAO reports should be sent to:

U.S. General Accounting Office
Document Handling and Information
Services Facility
P.O. Box 6015
Gaithersburg, Md. 20760

Telephone (202) 275-6241

The first five copies of individual reports are free of charge. Additional copies of bound audit reports are $3.25 each. Additional copies of unbound report (i.e., letter reports) and most other publications are $1.00 each. There will be a 25% discount on all orders for 100 or more copies mailed to a single address. Sales orders must be prepaid on a cash, check, or money order basis. Check should be made out to the "Superintendent of Documents".

ENERGY AND MINERALS DIVISION

DIRECTOR: J. Dexter Peach, 275-3567

DEPUTY DIRECTOR: Douglas McCullough, 275-3678

SENIOR ASSOCIATE DIRECTOR: F. Kevin Boland, 376-9715
Economic Regulation of Energy
Gerald Elsken, 376-9710
Fossil Fuels
Flora Milans, 353-3408
Energy Information and Organization
Ed Kratzer, 376-9713

ASSOCIATE DIRECTOR: John Sprague, 275-3572
Federal Resources
Lowell Mininger, 254-6937
Materials
John Badd, 275-6461
Gus Johanson, 275-6461

ASSOCIATE DIRECTOR: Dan White, 353-4761
Nuclear Energy
John Harman, 353-4761
Energy Agency Management
Lucille Perholtz, 353-4761
Electric Power
John Brown, 275-3572

SENIOR GROUP DIRECTOR: Jim Duffus, 353-3711
Energy Conservation
Bill Oelkers, 352-1400
Renewable Energy
Tom Melloy, 353-5720

SENIOR GROUP DIRECTOR: Don Forcier, 275-3563
Energy Policy
International Energy

ASSISTANT TO THE DIRECTOR FOR
PLANNING AND ADMINISTRATION: Bill McGee, 275-4902

COORDINATORS:
Energy: John Tavares, 275-4915
Materials: Ronald Stouffer, 254-7391

PROPOSED REORGANIZATION OF THE DEPARTMENT OF ENERGY

FOR

FISCAL YEAR 1983

FY 1983 BUDGET

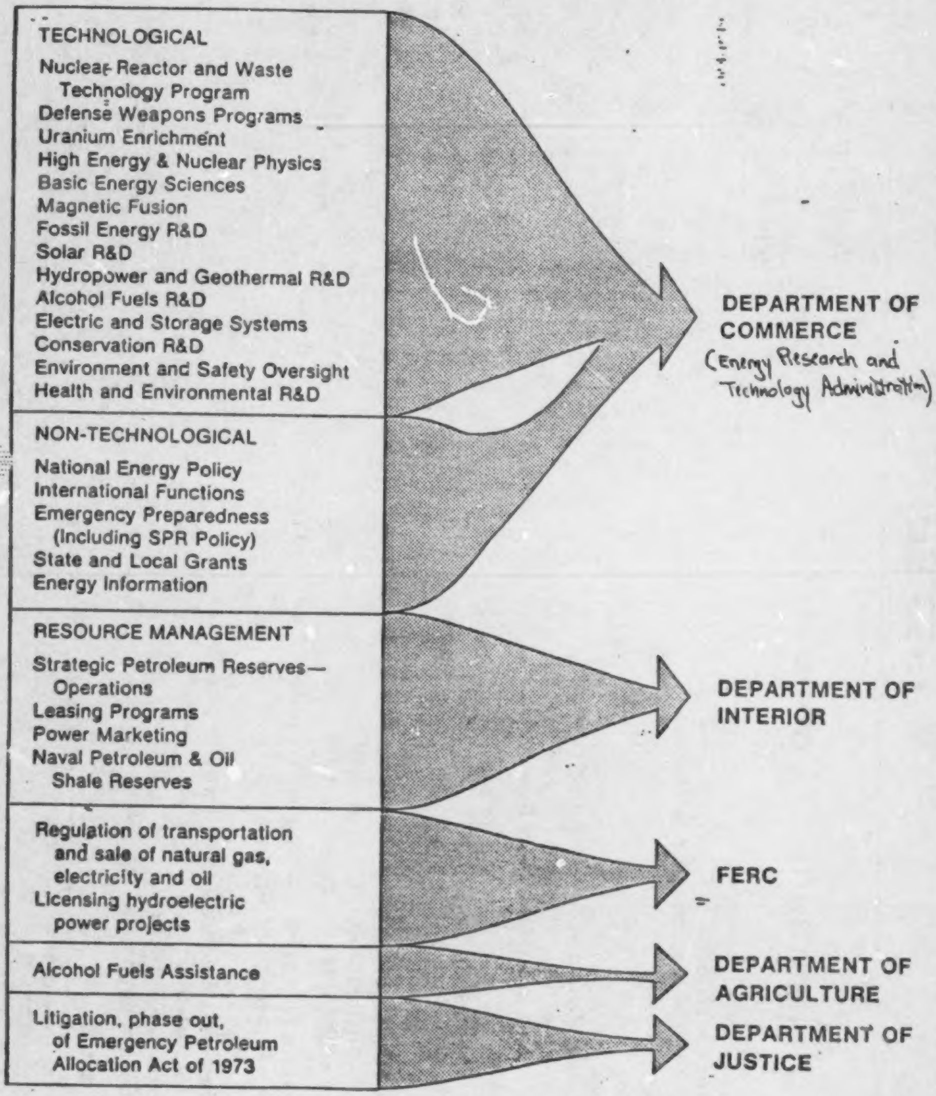
Highlights

Department of Commerce

The Department of Commerce will receive the bulk of DOE programs.

- **A new agency (Energy Research and Technology Administration) will be established within Commerce to manage:**
  - **Energy Research and Development**
  - **Uranium Enrichment**
  - **General Science**
  - **Defense Activities**
- **The Energy Information Administration, Emergency Preparedness Activities and Conservation Grant Management will also be Transferred to Commerce.**

REORGANIZING ENERGY PROGRAMS


TECHNOLOGICAL
Nuclear Reactor and Waste Technology Program
Defense Weapons Programs
Uranium Enrichment
High Energy & Nuclear Physics
Basic Energy Sciences
Magnetic Fusion
Fossil Energy R&D
Solar R&D
Hydropower and Geothermal R&D
Alcohol Fuels R&D
Electric and Storage Systems
Conservation R&D
Environment and Safety Oversight
Health and Environmental R&D
NON-TECHNOLOGICAL
National Energy Policy
International Functions
Emergency Preparedness (Including SPR Policy)
State and Local Grants
Energy Information
RESOURCE MANAGEMENT
Strategic Petroleum Reserves—Operations
Leasing Programs
Power Marketing
Naval Petroleum & Oil Shale Reserves
Regulation of transportation and sale of natural gas, electricity and oil
Licensing hydroelectric power projects
Alcohol Fuels Assistance
Litigation, phase out, of Emergency Petroleum Allocation Act of 1973
DEPARTMENT OF COMMERCE
(Energy Research and Technology Administration)
DEPARTMENT OF INTERIOR
FERC
DEPARTMENT OF AGRICULTURE
DEPARTMENT OF JUSTICE

FY 1983 BUDGET

Department of Commerce

	Budget Authority		
	1981	1982	1983
	($ in Millions)		
Energy Research and Technology Administration			
Research and Development Programs			
Magnetic Fusion	$ 394	$ 454	$ 444
Nuclear Fission	1,051	1,089	1,016
Environment	230	224	169
Supporting Research and Technical Analysis	316	334	347
Fossil Energy	994	566	107
Conservation Solar and Other Renewables	1,048	518	101
Subtotal	$ 4,033	$ 3,185	$ 2,184
Uranium Enrichment	−23	−25	
General Science	517	548	601
Defense Activities	3,690	4,691	5,506
Alternative Fuels Production	−300	—	—
Program Administration	242	240	153
Less Use of Prior Year Deferrals and Transfers	−6	−368	—
Subtotal Energy Research and Technology Administration	$ 8,153	$ 8,271	$ 8,444
Non-R&D Energy Activities			
Energy Conservation Grants	$ 430	$ 240	$ 4
Emergency Preparedness and Energy Regulation and Energy Information	180	100	64
Administrative Support	28	23	5
Less Reappropriation and Transfers	—	−185	—
Subtotal	$ 638	$ 178	$ 73
Total Department of Commerce	$ 8,791	$ 8,449	$ 8,517

FY 1983 Budget

Staffing

	Actual Employment-Total	Full-Time Equivalents-Total	
	FY 1981	FY 1982	FY 1983
Department of Energy	19,330	18,375	0
Department of Commerce			
Energy Research and Technology Admin.	—	—	5,966
Non-Research and Development Activities	—	—	705
Subtotal	0	0	6,671
Department of the Interior	0	0	5,623
Department of Justice	0	0	415
Federal Energy Regulatory Commission	(Included in DOE Above)		1,832
Total	19,330	18,375	14,541

FY 1983 BUDGET

Staffing

Department of Commerce

	Actual Employment - Total	Full-Time Equivalents - Total	
	FY 1981, End of Year	FY 1982	FY 1983
Energy Research & Technology Administration			
Research and Development Programs			
Magnetic Fusion	67	71	71
Nuclear Fission	479	532	423
Environment	210	204	105
Supporting Research and Technical Analysis	524	513	245
Fossil Energy	1,289	1,131	541
Conservation Solar and Other Renewables	501	406	106
Subtotal	3,070	2,857	1,491
Uranium Enrichment	126	146	69
General Science	35	36	36
Defense Activities	2,287	2,327	2,207
Program Administration	4,146	3,975	2,163
Subtotal	9,664	9,341	5,966
Overauthorization Adjustment	—	−94	—
Subtotal Energy Research and Technology Administration	9,664	9,247	5,966

FY 1983 BUDGET

Staffing

Department of Commerce

	Actual Employment - Total	Full-Time Equivalents - Total	
	FY 1981, End of Year	FY 1982	FY 1983
Non-R&D Energy Activities			
Energy Conservation Grants	162	100	64
Emergency Preparedness and Energy Regulation	439	181	138
Energy Information	603	584	415
Administrative Support	341	316	88
Subtotal	1,545	1,181	705
Total Department of Commerce	11,209	10,428	6,671

Congressional Research Service
The Library of Congress

Washington, D.C. 20540

March 26, 1982

TO : Subcommittee on Energy Conservation and Supply
Attention: Gary Barbour

FROM : Fred Sissine FS.
Analyst in Science and Technology
Science Policy Research Division

SUBJECT : Energy Budget Charts

This responds to your request of March 11, and our subsequent conversations concerning the preparation of visual materials on the Department of Energy (DOE) budget.

Enclosed are charts and supporting tables depicting: (1) A budget comparison by function for FY82 and FY83, (2) Budget comparisons within the Energy Function for FY82 and FY83, and (3) A detailed budget comparison of the Energy Conservation, Solar Energy and Other Renewable Energy Programs for FY81, FY82, and FY83.

If we may be of further assistance, please do not hesitate to call (287-7038).

Enclosures

FS(JGM,GHM)tl

Department of Energy
Budget Comparison by Function
(Budget Authority in millions)

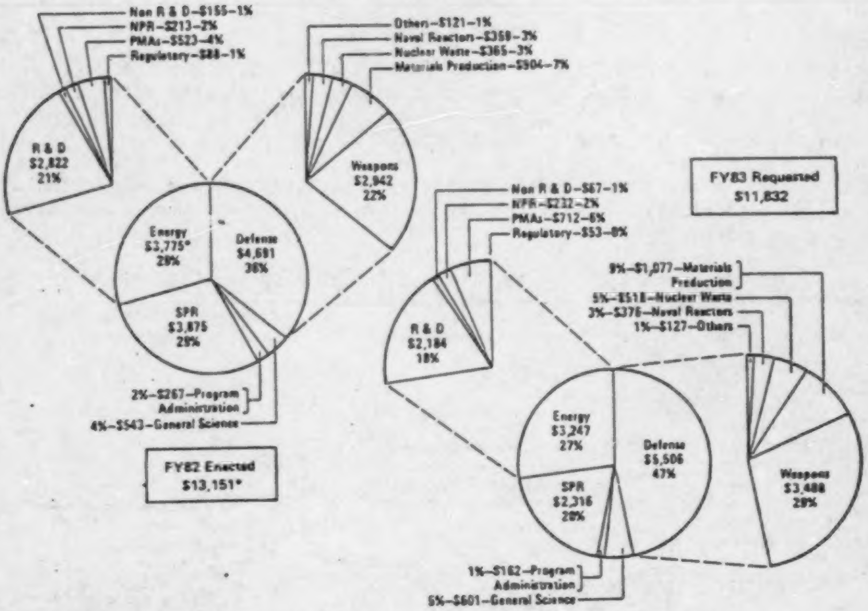
Program Area	FY82 Enacted	% of Total	FY83 Requested	% of Total	% Change
Defense	4,691	36%	5,506	47%	+ 17%
Strategic Petroleum Reserve (SPR)	3,876	29%	2,316	20%	- 40%
Energy R&D	3,775	29%	3,247	27%	- 14%
General Science	543	4%	601	5%	+ 11%
Program Administration	267	2%	162	1%	- 39%
TOTALS	13,151	100%	11,832	100%	- 10%

Source: U.S. Department of Energy. Federal Energy Programs FY83: Budget Highlights, February 1982. (DOE/MA-0062)

Department of Energy

BUDGET COMPARISON BY FUNCTION

(Budget Authority in millions)



* $26 million for Uranium Enrichment Revenues has been deleted.

Source: U.S. Department of Energy, Federal Energy Programs FY83: Budget Highlights, February 1982. (DOE/MA-0062)

Department of Energy
Budget Comparisons within the Energy Function
(Budget Authority in millions)

Total Energy Activities	FY82	%	FY83	%	% Change
Energy Research & Development	2,822	74%	2,184	67%	-23%
Uranium Enrichment	- 25	--	--	--	--
Power Marketing Administrations (PMAs)	523	14%	712	22%	+36%
Naval Petroleum Reserves (NPR)	213	6%	232	7%	+ 9%
Non R&D Energy Functions	154	4%	67	2%	-57%
Regulatory Activities	88	2%	53	2%	-40%
TOTALS	3,775	100%	3,247	100%	-14%

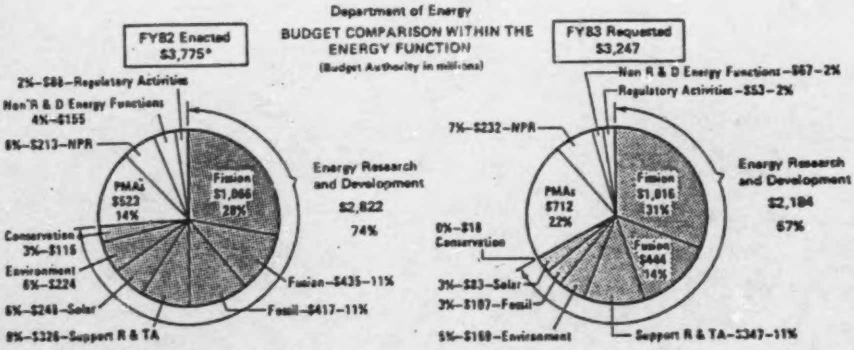
Energy R&D Activities	FY82	%	FY83	%	% Change
Nuclear Fusion	435*	15%	444	20%	+ 2%
Nuclear Fission	1,066	38%	1,016	46%	- 5%
Fossil	417	15%	107	5%	-74%
Solar and Other Renewables	248**	9%	83	4%	-67%
Conservation	115***	4%	18	1%	-84%
Environment	224	8%	169	8%	-25%
Southwest Power Admin. Transfer	- 9	--	--	--	--
Support R&TA	326	11%	347	16%	+ 6%
TOTALS	2,822	100%	2,184	100%	-23%

*Does not include $19 million deferral ($454 million is the only figure cited for Fusion in Budget Highlights--which does include this deferral).

**Does not include $68 million in deferrals.

***Includes $38 million in budget authority for Energy Storage and $20 million in budget authority for Electric Energy Systems. Also, does not include $87 million in deferrals.

Source: U.S. Department of Energy, Federal Energy Programs FY83: Budget Highlights, February 1982. (DOE/MA-0062)



Department of Energy
BUDGET COMPARISON WITHIN THE ENERGY FUNCTION
(Budget Authority in millions)

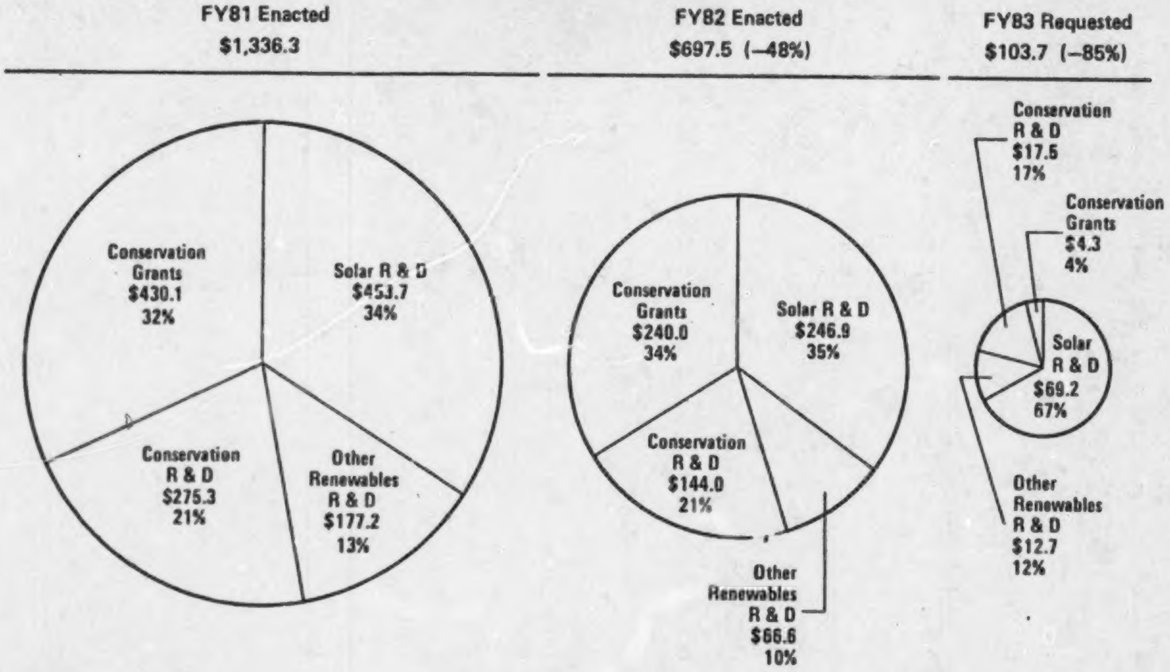
* $25 million for Uranium Enrichment Revenues has been deleted.

Source: U.S. Department of Energy, Federal Energy Programs FY83: Budget Highlights, February 1982. (DOE/MA-0062)

Department of Energy

BUDGET COMPARISON OF THE ENERGY CONSERVATION, SOLAR ENERGY AND OTHER RENEWABLE ENERGY PROGRAMS

(Budget Authority in millions)



Source: U.S. Department of Energy, Congressional Budget Request FY83, February 1982, vols. 2, 5, 6. (DOE/MA-0057)

Department of Energy
Detailed Budget Comparison of the Energy Conservation, Solar Energy, and Other Renewable Energy Programs
(Budget Authority in millions)

Program	FY81*	FY82**	FY83***
Energy Conservation R&D			
Buildings	91.3	47.7	0
Industrial	69.6	28.8	0
Transportation	105.0	58.9	0
Multisector	9.4	8.6	17.5
SUBTOTALS	275.3	144.0	17.5
Percentage of Grand Totals	21%	21%	17%
Energy Conservation Grants			
Weatherization	175.0	144.0	0
Schools & Hospitals	150.0	48.0	0
State Planning (EPCA)	47.8	24.0	0
Energy Extension Service	20.0	9.6	0
Inventions	5.8	5.2	0
Appropriate Technology	12.0	2.9	0
Impact Assistance	10.0	0	0
Program Direction	9.5	6.3	4.3
SUBTOTALS	430.1	240.0	4.3
Percentage of Grand Totals	32%	34%	4%
Total Percentage for Conservation	53%	55%	21%
Solar R&D			
Active	38.4	11.5	0
Passive	30.2	10.6	0
Photovoltaics	133.2	74.0	27.0
Thermal	112.0	53.0	18.0
Biomass	27.2	20.5	6.6
Wind	54.2	34.4	5.5
Ocean	34.6	18.8	0
Other Solar	23.9	24.1	12.1
SUBTOTALS	453.7	246.9	69.2
Percentage of Grand Totals	34%	35%	67%
Other Renewables R&D			
Alcohol Fuels	18.0	10.0	2.9
Geothermal	156.0	53.6	9.8
Hydropower	3.2	3.0	0
SUBTOTALS	177.2	66.6	12.7
Percentage of Grand Totals	13%	10%	12%
Total Percentage for Renewables	47%	45%	79%
GRAND TOTALS	$1,336.3	697.5	103.7

*Includes Reagan Administration FY81 Rescissions
**Includes FY81 Deferrals
***Represents Adminstration Request for FY83

Source: U.S. Department of Energy, Congressional Budget Request FY83, February 1982, vols. 2,5,6. (DOE/MA-0057)

Program Activities

DOE State & Local Assistance Programs

1981 Report

TABLE OF CONTENTS

PROGRAMS PAGE

State Energy Conservation 1
Energy Extension Service 6
Weatherization Assistance 12
Institutional Conservation 17
Energy-Related Inventions 22
Appropriate Technology Small Grants 28
Grants Management and Technical Assistance 32

STATE ENERGY OFFICES 35

STATE ENERGY CONSERVATION PROGRAM

The State Energy Conservation Program (SECP) was created to promote energy efficiency and reduce the growth rate of energy demand in participating States. The program was established by the Energy Policy and Conservation Act of 1975 and amended by the Energy Conservation and Production Act of 1976.

Under this program, States and Territories may voluntarily enter into a cooperative endeavor with the Federal government to improve energy efficiency within their jurisdictions. Presently, fifty States and seven Territories are participating in the program. These States and Territories have developed and are in the process of implementing comprehensive State energy conservation plans designed to achieve specific energy efficiency goals. The Federal government provides technical and financial assistance.

To be eligible for Federal financial assistance, each participating State and Territory must adopt five mandatory measures specified in the 1975 legislation. The Energy Policy and Conservation Act measures are:

- implementing lighting efficiency standards for non-Federal public buildings;
- promoting the availability and use of carpools, vanpools, and public transportation;
- implementing standards and policies relating to energy efficiency in the procurement practices of a State and its political subdivisions;
- implementing thermal efficiency standards and insulation requirements for new and renovated non-Federal buildings; and
- enacting a traffic law or regulation which permits motor vehicles to turn right at a red light after stopping.

In 1976, the Energy Conservation and Production Act amended the program to provide supplemental financial assistance to participating States and Territories that adopt and implement three additional mandatory measures. The measures are:

- designing and carrying out a continuing public education effort to promote energy conservation measures;
- ensuring effective intergovernmental coordination; and
- encouraging and conducting energy audits for buildings and industrial plants not served by other Federal programs.

However, the supplemental program will not be funded in fiscal year 1982.

States may also propose to include additional energy conserving measures which they consider appropriate for their local needs. If approved by the Department of Energy (DOE), these additional measures may be implemented with Federal financial assistance. Some of these measures have resulted in very significant energy savings.

SERVICES

In addition to financial assistance, DOE provides information and technical assistance to the States for the development and implementation of their conservation plans. A major objective of the technical assistance provided has been to ensure that States have sufficient technical support to effectively implement the various energy efficiency measures included in their plans. The technical assistance services offered include:

- source books describing the program and outlining various measures that could be incorporated into a State plan;
- information clearinghouse and retrieval capability;
- printed materials ranging from posters, pamphlets, and training materials to complex technical reports;
- seminars and workshops; and
- coordination and liaison, including exchange of program status, information, and technical expertise.

Technical assistance provided to States during 1981 included guidance to improve the accuracy of state energy savings estimates and simplification of application and reporting requirements.

FUNDING

Funds appropriated for the Energy Policy and Conservation Act base program totaled $200 million. Funding in FY 1981 amounted to $38 million. Funding for the Energy Conservation and Production Act supplemental program totaled $57 million through 1980 and $10 million for FY 1981. However, this supplemental program will not be funded in FY 1982.

ACCOMPLISHMENTS

Establishment of State Energy Conservation Capability

Most States did not have State Energy Offices prior to implementation of the State Energy Conservation Program. The SECP provided States with funding needed to establish or expand their capability to plan, design, and implement a wide variety of energy conservation measures. In addition, to carryout a variety of energy conserving programs initiated by and continued with SECP funds, this basic State energy conservation capacity has been a springboard for the establishment for other energy conservation programs, such as the Residential Conservation Service and the Institutional Buildings Grants Program (Schools and Hospitals), which were enacted after SECP.

Impact of Program

A recent study indicates that the 1980 energy savings attributable to SECP (i.e., that occurred above and beyond savings that would have occurred without the program) are 191.1 trillion Btu's. The total lifetime dollar value of these savings was about $13 billion. This can be compared to the cumulative Federal cost of the SECP in terms of dollars appropriated from fiscal years 1976-1980 of $217 million, yielding a benefit to Federal cost ratio of 60. Although this comparison does not include costs incurred by the private sector in implementing the conservation actions promoted by SECP, it shows that SECP has achieved energy savings at a very favorable Federal cost-to-benefit ratio.

Implementation of Basic Energy Conservation Measures

The SECP strategy for getting States off to a fast start on energy conservation was to require implementation of certain basic conservation activities. Most of these required measures are being implemented on a continuing basis nationwide. All States are implementing programs to encourage carpools, vanpools, and public transportation; to promote energy conservation measures through public education efforts; to ensure effective intergovernmental coordination; and to provide energy audits for buildings and industrial plants. Most States have implemented energy efficient procurement practices and right turn on red, and many have adopted lighting and thermal efficiency standards for buildings.

Innovative Activities

In addition to implementing the required program measures, the States have a great deal of flexibility in developing other programs to help them achieve their energy conservation goals. Over 60 percent of the reported energy savings have been achieved by voluntary State activities. Some examples of innovative programs the States have developed under SECP to meet their needs are:

- energy audits, improved energy management, conservation retrofits, and computerized monitoring of energy consumption in State buildings (Montana);
- industrial consortia for exchange of information on fuel conversions, cogeneration, and other aspects of energy conservation (Missouri);
- energy resources groups to implement procedures for energy efficient procurement (Illinois);
- purchase of recycled paper (Maryland);
- Statewide residential insulation service (Rhode Island); and
- State tax incentives to manufacturers and purchasers of solar equipment (Puerto Rico).

State Energy Conservation Program Grants
Fiscal Year 1981

State	Base Program	Supplemental Program	Total Under Both Programs
Alabama	$ 488,900	$157,600	$ 646,500
Alaska	172,900	53,700	226,600
American Samoa	124,100	41,700	165,800
Arizona	316,300	112,500	428,800
Arkansas	414,500	108,300	522,800
California	1,796,000	729,400	2,525,400
Colorado	346,200	123,500	469,700
Connecticut	362,100	139,900	502,000
Delaware	181,700	59,400	241,100
District of Columbia	191,200	63,100	254,300
Florida	916,500	307,500	1,224,000
Georgia	551,800	199,500	751,300
Guam	128,600	44,300	172,900
Hawaii	186,200	69,000	255,200
Idaho	196,800	67,500	264,300
Illinois	1,273,900	399,000	1,672,900
Indiana	754,800	211,000	965,800
Iowa	425,200	133,300	558,500
Kansas	407,700	114,600	522,300
Kentucky	511,400	150,700	662,100
Louisiana	712,700	164,900	877,600
Maine	214,800	75,000	289,800
Maryland	464,400	172,500	636,900
Massachusetts	558,500	225,100	783,600
Michigan	1,123,400	331,600	1,455,000
Minnesota	547,500	167,700	715,200
Mississippi	341,800	116,600	458,400
Missouri	518,800	194,300	713,100
Montana	190,800	64,900	255,700
Nebraska	273,800	90,500	364,300
Nevada	186,900	60,300	247,200
New Hampshire	186,900	67,300	254,200
New Jersey	818,100	274,400	1,092,500
New Mexico	241,200	78,200	319,400
New York	1,636,700	615,600	2,252,300
North Carolina	653,600	215,500	869,100
North Dakota	172,800	61,500	234,300
N. Marianas Islands	123,300	41,300	164,600
Ohio	1,118,500	382,800	1,501,300
Oklahoma	428,800	129,300	558,100
Oregon	367,600	115,200	482,800

State Energy Conservation Program Grants
Fiscal Year 1981 (continued)

State	Base Program	Supplemental Program	Total Under Both Programs
Pennsylvania	1,277,500	418,100	1,695,600
Puerto Rico	319,700	143,600	463,300
Rhode Island	221,500	70,500	292,000
South Carolina	348,900	131,500	480,400
South Dakota	176,500	62,700	239,200
Tennessee	541,800	176,100	717,900
Texas	1,688,000	442,500	2,130,500
Trust Territory	128,900	44,700	173,600
Utah	241,300	80,400	321,700
Vermont	167,300	56,000	223,300
Virginia	580,400	202,200	782,600
Virgin Islands	129,100	43,900	173,000
Washington	358,000	156,600	514,600
West Virginia	301,300	99,400	400,700
Wisconsin	613,300	188,500	801,800
Wyoming	178,800	53,300	232,100
State Total	27,900,000	9,300,000	37,200,000
DOE Program Support	2,467,000	700,000	3,167,000
Allocated for Gas Rationing Program	7,433,000	0	7,433,000
Total Appropriation	$37,800,000	$10,000,000	$47,800,000

ENERGY EXTENSION SERVICE

The Energy Extension Service (EES) is a Federal/State partnership established by Congress to provide small-scale energy users with personalized information and technical assistance on energy conservation and the use of renewable resources. Fifty States and seven Territories receive grants to help individuals, small businesses, and local governments take practical steps to conserve energy.

The EES is authorized by the National Energy Extension Service Act of 1977. The program was initiated as a two year pilot program in ten States: Alabama, Connecticut, Michigan, New Mexico, Pennsylvania, Tennessee, Texas, Washington, Wisconsin, and Wyoming. Based on an evaluation of the pilot program, which demonstrated its effectiveness, Congress approved expansion of the effort nationwide, which was announced in August 1979.

DOE provides EES grant funds to State Energy Offices or other State entities designated by the Governor to manage the program. States distribute these funds to their individual projects according to a plan which they prepare and submit to DOE.

In keeping with program emphasis on meeting local needs, the extension services provided are diverse and innovative.

SERVICES

An evaluation by DOE of the Energy Extension Service pilot program has shown that it is cost-effective to provide personalized assistance to small-scale energy users through State designed and implemented programs.

Cumulative funding for the Energy Extension Service Program through FY 1980 was $55 million. Funding for FY 1981 totaled $20 million.

The following are some examples of services that were implemented through State EES programs.

- In Santa Clara, California, fleet drivers from large companies such as Pacific Gas & Electric and Pacific Telephone are receiving special training in fuel efficient driving techniques. Drivers who employ these techniques in handling their cars, and who apply principles of trip planning and fuel saver maintenance, can cut their annual gasoline bills from 10 to 20 percent; also this driver training program has been expanded and is being offered to local governments, small businesses, community colleges, and public schools.

- The New Mexico Energy Extension Service received so much response to its self-help, solar greenhouse program that DOE provided additional funds to permit the training of people from other States in setting up such programs. Nineteen States sent representatives to the training program and subsequently tested the approach, each constructing at least one greenhouse attached to a home. The States of Washington and Wyoming reported a substantial continuing demand for the service.

- The Nebraska Energy Extension Service is conducting a program called PUMP (irrigation pump unit management program) to help farmers improve the efficiency of their irrigation systems and pumping plants. Tests show that the average pumping system uses 25 percent more fuel than needed. If all irrigation pumping units in Nebraska were engineered and adjusted properly, about 50 million gallons of diesel fuel equivalent could be saved annually. During July, August, and September 1980, PUMP demonstrations were held in 58 Nebraska counties. Fuel adjustment savings in irrigation pumps netted a high of $1,115 from one well.

- In December 1977, the Michigan Energy Extension Service set up a combined energy information clearinghouse and hotline. As of December 1980, an average of 3,500 telephone and written requests were being received each month. The Michigan service began with a philosophy of "no referrals" and personalized service, a fundamental principle in all energy extension efforts. The clearinghouse became the focal point for requests, not only from the public as originally intended, but from industry, local governments, and other State agencies as well.

- The Maine Energy Extension Service has set up a program to assist low income groups and residents on fixed incomes to save energy. Grants are being made available to nonprofit organizations such as church groups, granges, Meal-on-Wheels, Head Start, and retired senior volunteers to purchase low cost conservation materials. These materials are being used to conduct hands-on workshops where individuals use the materials and information to weatherize their homes and at the same time learn conservation techniques. In addition to the above, the program complements a low cost/no cost program being offered to low income clients by the State Division of Community Services. This program serves a dual purpose in Maine--it teaches weatherization to low income and nonprofit groups and at the same time weatherizes individual homes and nonprofit group buildings.

ACCOMPLISHMENTS

Establishment of National Program

Based on the favorable results of the two year, ten State pilot program, EES was expanded nationwide in FY 1980. Fifty-seven States and Territories are now offering personalized assistance to energy users on practical, energy saving opportunities. Services such as energy audits and self-help workshops are tailored to the needs of homeowners, small businesses, local governments, and other public institutions. States are given broad flexibility in service design so that particular local needs can be met through the program and so that EES activities can be used to supplement or complement other conservation and renewable resource programs.

Impact of Program

An evaluation of the national EES program is in progress with results expected in mid-1982. Evaluation of the EES pilot program indicates that 90 percent of the clients found the service useful; 51 percent found the EES service more useful than from any other source. A comparison of the actions taken showed that clients took half again as many energy conservation actions as non-clients.

Analysis of the pilot effort also demonstrated that programs that provide personalized assistance specific to the needs of the individual or organization will influence energy consumers to take energy conserving measures they would not otherwise take. EES clients in the ten pilot States saved the equivalent of 6,400 barrels of oil per day beyond what would have been saved without the program. The cost of achieving these additional energy savings including client investments averaged $8.50 per barrel of oil equivalent. Compared to the cost of buying a barrel of imported oil ($30-$35), the EES has been cost-effective.

EES Leverage

EES pilot program clients invested $59.9 million more on energy conservation measures than did comparable non-clients. Since the EES program cost was $3.7 million for the ten pilot programs, EES expenditures leveraged $16 of private investment in conservation for every EES dollar expended.

In addition, the program had a multiplier effect in stimulating self-sustaining action by others. For example, the National Restaurant Association and DOE funded a nationwide expansion of the Wisconsin EES program for audits and technical assistance for energy conservation in restaurants.

Technical Assistance Concept

EES has spearheaded a technical assistance concept and operation that pulls together existing resources, makes then easily accessible to States, and encourages the building of independent State capability for handling repetitive needs. EES also serves as a laboratory for other programs by conducting intensive evaluations of many different types of services. EES is generating knowledge about, for example, the best ways to conduct energy audits, small business services and services to low income groups, as well as the energy saving impact and cost-effectiveness ratios that can reasonably be expected.

EES Coordination Services

EES has served as an integrating and coordinating mechanism for the delivery of energy conservation services by States and for matching technical backup to support those services. EES also acts as a referral service to help energy consumers find services they need which may be offered by other programs.

Evaluation Methodology

Until the pilot program there was no accepted methodology for evaluating the cost-effectiveness of an outreach program such as EES. The detailed evaluation of the EES pilot program, which included consumer surveys, regular field interviews, and State reported data, was extremely effective in identifying factors that influence program effectiveness. Case studies of EES pilot programs to small businesses, local governments, and low income clients were compiled to document successful approaches to providing outreach services and achieving energy savings. State officials participating in the nationwide program benefited from lessons learned in the pilot effort. Their clients are expected to benefit from the higher quality of EES services offered as a result of the pilot effort.

GRANTS AWARDED UNDER EES

STATE	FY 1981
Alabama	$ 316,700
Alaska	175,900
American Samoa	163,500
Arizona	241,900
Arkansas	248,500
California	1,057,700
Colorado	261,400
Connecticut	298,200
Delaware	186,900
District of Columbia	196,200
Florida	466,800
Georgia	368,000
Guam	166,200
Hawaii	196,800
Idaho	194,200
Illinois	660,400
Indiana	395,200
Iowa	288,900
Kansas	263,100
Kentucky	306,700
Louisiana	325,700
Maine	206,800
Mariana District	162,800
Maryland	338,200
Massachusetts	417,300
Michigan	560,500
Minnesota	332,900
Mississippi	261,700
Missouri	372,000
Montana	193,400
Nebraska	228,900
Nevada	184,200
New Hampshire	195,400
New Jersey	483,800
New Mexico	207,900
New York	980,100
North Carolina	390,200
North Dakota	190,000
Ohio	640,100
Oklahoma	277,000
Oregon	256,100
Pennsylvania	691,400
Puerto Rico	284,100
Rhode Island	204,900

GRANTS AWARDED UNDER EES (Continued)

STATE	FY 1981
South Carolina	278,400
South Dakota	192,100
Tennessee	338,300
Texas	664,400
Trust Territory	166,900
Utah	209,800
Vermont	182,200
Virginia	370,800
Virgin Islands	165,200
Washington	315,300
West Virginia	240,500
Wisconsin	360,400
Wyoming	177,200
Total Grants Awarded	18,500,000
Program Support	1,500,000
TOTAL	$20,000,000

WEATHERIZATION ASSISTANCE PROGRAM

The Weatherization Assistance Program is intended to reduce the use of fuels by low income families and thereby decrease national energy consumption, particularly of imported oil, by weatherizing the homes of low income persons. An equally important benefit is to help the poor and elderly live more comfortably with more of their limited incomes available for other essentials.

The weatherization effort is authorized by the Energy Conservation and Production Act of 1976, as amended by the National Energy Conservation Policy Act of 1978, and the Energy Security Act of 1980. Local organizations, usually community action agencies, implement the program.

SERVICES

Most of the homes weatherized under this program are caulked and insulated; some have storm windows installed. Other weatherization materials that can be installed include furnace efficiency modifications, clock thermostats, water heater insulation, vapor barriers, skirting, and water flow controllers.

The maximum expenditure per dwelling for materials and related costs is $1,000. This amount may be increased to $1,600 to pay for labor. Incidental repair costs are limited to $150.

FUNDING

Appropriated funds ($ in million) for this program by fiscal year are as follows:

1977	1978	1979	1980	1981	1982
$27.5	$65	$199	$199	$175	$144

Funds are tentatively allocated to the States according to a formula based on the numbers of low income households in each State, the annual heating and cooling degree days, and the percentage of total residential energy used for space heating and cooling. Funds are granted to the States based on their ability to expend those funds and to provide services to the low income population. In FY 1982 the States have been allocated $143,040,000 as shown in the following table.

STATE	TOTAL FY 82 ALLOCATION
Connecticut	$ 2,031,729
Maine	2,279,756
Massachusetts	4,385,293
New Hampshire	1,085,006
Rhode Island	869,841
Vermont	1,073,900
Total Boston Support Office (SO)	11,725,525
New Jersey	3,797,446
New York	15,031,664
Total New York SO	18,829,110
Delaware	384,912
District of Columbia	500,775
Maryland	1,653,269
Pennsylvania	10,309,962
Virginia	2,284,816
West Virginia	1,998,836
Total Philadelphia SO	17,132,570
Illinois	8,736,577
Indiana	4,112,322
Michigan	10,167,630
Minnesota	7,533,196
Ohio	8,405,580
Wisconsin	5,596,442
Total Chicago SO	44,551,747
Total Chicago Operations Office (OO)	92,238,952
Alabama	1,276,378
Florida	452,770
Georgia	1,414,864
Kentucky	2,854,596
Mississippi	841,603
North Carolina	2,420,937
South Carolina	789,820
Tennessee	2,512,584
Total Atlanta SO/Savannah River OO	12,563,552
Arkansas	1,240,927
Louisiana	597,676
New Mexico	1,106,039
Oklahoma	1,478,177
Texas	1,964,457
Total Dallas SO	6,387,276

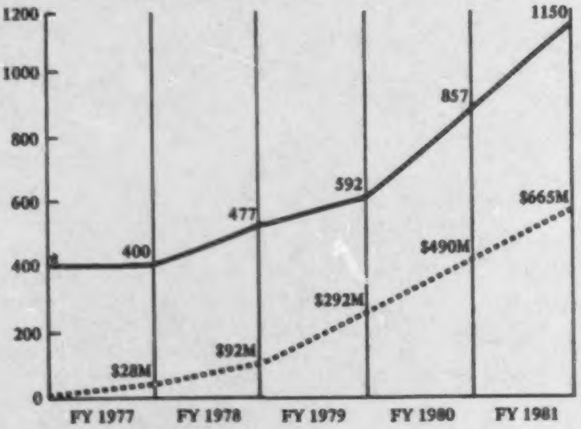
STATE	TOTAL FY 82 ALLOCATION
Iowa	3,573,245
Kansas	1,490,842
Missouri	4,396,358
Nebraska	1,869,831
Total Kansas City SO	11,330,276
Total Albuquerque OO	17,717,552
Colorado	2,862,076
Idaho	1,180,765
Montana	1,562,887
North Dakota	1,719,394
South Dakota	1,491,208
Utah	1,262,647
Wyoming	650,894
Total Denver SO/Idaho Falls OO	10,729,871
Arizona	493,293
California	3,695,224
Hawaii	108,703
Nevada	345,388
Total San Francisco OO	4,642,608
Alaska	813,950
Oregon	1,699,356
Washington	2,634,159
Total Richland OO	5,147,465
Total	$ 143,040,000

ACCOMPLISHMENTS

The Federal effort to weatherize homes of low income families began on an emergency basis soon after the 1973 oil embargo. In 1975, a formal weatherization program was set up by legislation to be administered by the Community Services Administration. This agency made grants directly to local organizations, which concentrated their efforts on inexpensive and easy to install measures. In three years some 400,000 dwellings were weatherized.

In 1976, Congress enacted the Energy Conservation and Production Act, authorizing a weatherization grant program to run parallel to and supplement the existing program. In 1979, DOE became the sole Federal agency responsible for weatherization assistance grants. From December 1977 through December 31, 1981, 800,000 additional homes were weatherized. Appropriations and results are reflected in the following graph.

DOE Weatherization Program



Homes Weatherized (thousands)
Appropriated Dollars (millions)

*Baseline begins with 400,000 homes weatherized through Community Services Administration (1973-1977)

The DOE has taken a series of steps in the past two years that have strengthened the program's management and increased weatherization production and expenditures. Briefly, the program has:

- weatherized 265,000 homes in FY 1980 and 292,000 homes in FY 1981 compared to 115,000 homes in FY 1979 and
- expended $178 million in FY 1980 and $268 million in FY 1981 compared to $45 million in FY 1979.

According to a recent study, the equivalent of over 3.2 million barrels of oil will be conserved each year in the 800,000 homes weatherized so far through the DOE program. As a result, less petroleum is imported and the Nation's balance of payments is enhanced accordingly. At current fuel prices, the average homeowner saves $120 each year after weatherization.

INSTITUTIONAL CONSERVATION PROGRAM*

This program provides financial assistance in the form of matching grants to aid several types of institutions in identifying and implementing energy conservation activities in their buildings. Authorized by the National Energy Conservation Policy Act of 1978, this effort is administered through the energy offices of each of the 50 States, the District of Columbia, Puerto Rico, the Virgin Islands, Guam, and American Samoa. The following types of institutions are eligible for grants.

- Public and private nonprofit schools, hospitals, and public care institutions
- Local governments
- States

SERVICES

Preliminary Energy Audits (PEAs) are statewide surveys to determine the energy conservation characteristics of eligible buildings by gathering data such as number of buildings, sizes, types, ownership, rates of energy use, major energy-using systems, and local climates. These audits were conducted by the States to provide information for planning purposes. All funds appropriated for this phase of the program were granted in FY 1980.

Energy Audits (EAs) are more detailed than preliminary energy audits and examine hours of operation, general operating practices, maintenance procedures, and building physical characteristics to determine whether there are maintenance and operating procedures that will reduce energy use. Energy audits are a State-level responsibility, providing baseline information to determine which buildings should be assigned highest priority for receiving technical assistance. All funds appropriated for this phase of the program were granted in FY 1980.

Technical Assistance (TA) Analyses are detailed professional analyses that report the specific costs, energy savings, and payback periods obtainable from installation of equipment or physical changes to building structures.

Energy Conservation Measures (ECMs) are retrofit actions that can be taken to conserve energy. Assistance is available to design, purchase and install equipment, or make changes to building structures to reduce energy use. Only schools and hospitals are eligible to receive financial assistance for energy conservation measures.

---

*This program has been referred to in the past as the Institutional Building Grant Program or, more commonly, as "Schools and Hospitals."

Our analyses have shown that:

- an energy audit will generally identify changes that could reduce energy use by 10 to 20 percent;
- a technical assistance analysis will almost always identify enough no cost or low cost actions to pay for itself and will provide institutions a list of cost-effective building retrofit actions;
- the average payback period for a funded energy conservation measure is between 3 and 5 years;
- grants awarded through FY 1981 are saving an estimated $240 million to $290 million annually in school and hospital energy costs; and
- the total cost (DOE plus grantee share) to save a barrel of oil equivalent is $4.50 based on a conservative estimate of 10 years as the useful life of an energy conservation measure.

FUNDING

Through FY 1981, Congress had appropriated a total of $442 million for the Institutional Conservation Program. As of the end of FY 1981, approximately 99 percent of these funds had been granted. Congress has appropriated $48 million to this program for FY 1982. For preliminary energy audits and energy audits, States applied to DOE on behalf of themselves and their institutions. For technical assistance and energy conservation measures, institutions submit applications to their State Energy Offices. The States review and rank applications and make funding recommendations to DOE. The deadline for submission of applications is determined by individual States, after publication of the notice concerning the grant program cycle by DOE. The review process, including both State and Federal reviews, is generally completed within four months of the date an institution has submitted its application.

ACCOMPLISHMENTS

Energy audit results through June 30, 1980:

	Schools	Hospitals	Local Government	Public Care	Total
Buildings	294,598	14,516	116,196	24,396	449,706
EA's	48,042	3,641	4,000	2,014	57,691
EA Penetration	16%	25%	3%	8%	13%

After initial review and recommendation by its field offices, DOE approved State plans for implementing technical assessment and energy conservation measures in all 55 jurisdictions eligible to participate in these programs.

Eligible institutions submitted over 30,000 applications for technical assistance and energy conservation measure grants through FY 1981. DOE has made nearly 12,000 grant awards to individual institutions, totaling over $386 million and supporting approximately 29,000 institutional buildings.

Additionally, an automated business management information system, providing data on grant awards, review, and implementation tracking, was established in each DOE field office; and regulation revisions were promulgated to reduce administrative requirements, make more effective use of available funds, and provide more flexibility to DOE field offices, States, and institutions in implementing projects.

In FY 1982, the Institutional Conservation Program expects to continue making grants to schools, hospitals, local governments, and public care institutions using a $48 million appropriation. Other activities include monitoring and follow-up activities to ensure proper program implementation and quantification and analysis of costs/benefits and energy savings.

GRANT AWARDS THROUGH FY 1981 (TA & ECM)

State	Schools and Hospitals ($ in Millions)	Local Governments & Public Care Institutions ($ in Thousands)
Alabama	$ 5.5	$ 266
Alaska	2.3	23
American Samoa	1.2	49
Arizona	3.3	116
Arkansas	3.8	25
California	18.0	125
Colorado	5.2	63
Connecticut	6.4	156
Delaware	2.2	32
District of Colubmia	2.0	140
Florida	10.3	222
Georgia	7.0	47
Guam	0.5	0
Hawaii	2.0	31
Idaho	2.6	9
Illinois	20.5	157
Indiana	9.8	0
Iowa	6.9	34
Kansas	5.2	112
Kentucky	4.9	25
Louisiana	0.6	201
Maine	3.6	37
Maryland	7.7	96
Massachusetts	11.3	162
Michigan	18.8	876
Minnesota	10.6	303
Mississippi	3.6	19
Missouri	8.8	38
Montana	2.3	28
Nebraska	4.1	16
Nevada	8.6	17
New Hampshire	2.7	32
New Jersey	13.5	387
New Mexico	3.3	16
New York	32.3	2,100
North Carolina	8.0	53
North Dakota	2.4	0
Ohio	19.4	1,080
Oklahoma	4.9	165
Oregon	4.4	167
Pennsylvania	20.1	283
Puerto Rico	4.2	22
Rhode Island	2.6	34
South Carolina	4.4	19

GRANT AWARDS THROUGH FY 1981 (TA & ECM) (Continued)

State	Schools and Hospitals ($ in Millions)	Local Governments & Public Care Institutions ($ in Thousands)
South Dakota	2.7	23
Tennessee	7.3	75
Texas	15.1	247
Utah	2.7	4
Vermont	2.4	4
Virginia	8.4	148
Virgin Islands	0.9	0
Washington	6.6	163
West Virginia	2.6	5
Wisconsin	10.8	126
Wyoming	1.1	2
GRAND TOTALS	$382.4	$8,580

ENERGY-RELATED INVENTIONS PROGRAM

The Energy-Related Inventions Program, initiated under the Federal Non-Nuclear Research and Development Act of 1974, provides the individual inventor or small businessman with technical and financial assistance for developing and marketing an energy-related idea. The role of the Federal government is that of technical adviser and financial backer. The program offers one-time assistance, usually amounting to one year of financial and technical support.

If the one year support period is successful, the inventor should be in a position to:

- assemble, with confidence of success, the people and capital necessary to produce and market products derived from the invention through a business enterprise in which the inventor is a major participant;
- negotiate mutually beneficial arrangements with an existing company that will develop the inventor's product for commercialization; or
- compete effectively in obtaining contracts from other sources, including existing government programs, to permit further development of the invention.

This program provides for inventions to be evaluated by the Office of Energy-Related Inventions of the National Bureau of Standards (NBS). Those inventions assessed favorably are recommended to DOE to be considered for Federal support.

SERVICES

An inventor enters his or her idea for consideration by submitting an Evaluation Request Form to NBS. Examiners there ask three key questions in their evaluation process.

- Is the invention technically competent and unique?
- Will it save a significant amount of energy or is it a new source of energy?
- Does it have a reasonable chance of becoming a commercial success, given the appropriate Federal assistance?

Within DOE, each case is decided on the basis of individual merit and need. If the Department decides to assist the inventor, support can include a grant, a contract, or direct assistance of a technical nature.

FUNDING

Through September 1981, DOE has approved 104 grants. Total money awarded through FY 1981 amounts to $8.9 million. During FY 81 alone, DOE awarded 32 grants for a total of $2.9 million.

ACCOMPLISHMENTS

Inventions supported by DOE are now reaching the marketplace, and in many cases, achieving significant success. Energy, economic, and societal benefits to be derived from each of the following examples are substantial.

- In July 1977, DOE awarded a grant of $99,600 to Mr. G. R. Fitterer for his invention "control of Low Carbon Aluminum Steel." The DOE grant was awarded for a system to conserve energy by monitoring and controlling the amount of oxygen in a carbon aluminum killed steel melt. The system was highly successful. On the basis of the success, the steel company involved has initiated another research effort to apply the technology to other ferro melts, and the inventor has been credited with saving a steel company with $18 million annual gross business from bankruptcy.

- In September 1978, the DOE Inventions Program awarded a grant to Dan Ben-Schmeul, Heat Extractor Corporation, Johntown, New York, who used the $125,000 grant for a cooperative demonstration of his "Heat Extractor" at a Mohawk Paper Mill Plant. The device is a direct-contact heat exchanger that uses waste heat for heating water and has been installed at several hospitals and hotels. It has also been found very useful in certain industries that require large amounts of process hot water, hence the interest of Mohawk Paper Mills. The number of employees at the Extractor Corporation has increased from 20 to 250, and the company has a backlog of several million dollars in heat exchanger orders since the grant was awarded. Recently, Mr. Ben-Schmeul was successful in securing $400,000 in additional financing.

- In September 1979, a grant was awarded to Mr. James Bagby for his "Mini Brattice." This device is a reusable brattice, which is a partition used to form ventilation passage in coal mines. The Bagby Brattice is claimed to be quick and inexpensive to install and seals better than present stoppings. If widely adopted, an improved air seal can save the equivalent of several thousand tons of coal per year in reduced ventilation energy requirements. In addition, maintenance personnel normally assigned to the task are made available for the primary task of extracting coal, thereby increasing the productivity of the mine.

  The Department of Energy grant was awarded to provide for the fabrication and installation of 25 prototype brattices in a Southern Illinois underground coal mine. The terms of the grant provided that data would be collected over a 2 1/2 year period to measure the effects of natural subsidence on the performance of the brattices. Subsequent performance tests indicate that the device is already performing beyond all expectations and the tests have been terminated. The device has now been put into full-time use in this mine, and will soon be installed in other mines as well, with recent sales of $40,000 worth of brattices.

- Michael Zinn, Bio-Energy Systems, Inc., Spring Glen, New York, was awarded a DOE grant of $110,000 in March 1980 to generate, analyze, collate, and assemble information on his "Solaroll" device in a form usable to others in the trade and to operate and test the device for different applications. "Solaroll" is a flat-plate solar collector for hot water and building heating systems intended for mass production. The collector is an extrusion of ethylene-propylene-diamene (EPDA) rubber and has the advantages of being easy and cheap to install. Mr. Zinn's Bio-Energy Systems have become a profitable business over the last 3 years. He has raised over $2.5 million in capital though a public stock offering, has sales of over $4 million a year, and has secured a $350,000 SBA loan at 7% interest. He is now in the process of negotiating foreign licensing agreements.

- In June 1980, a grant of $150,000 was awarded to Paul J. Cromwell. Mr. Cromwell's "Processing Recovery of Aluminum" is a mechanical separation process operated at room temperature (except for the final furnace melting step) for separating aluminum metal from the dross. The Department of Energy grant was awarded to develop and optimize the complete design of a practical and economic production facility. Energy savings are an important part of this process, as aluminum has a high energy requirement for its initial production.

  The major advantage of Mr. Cromwell's process is the significantly high yield, about 90 percent more recovered aluminum than by the other two commonly used methods, or around 40 to 45 percent primary metal per unit weight of dross. An inherent environmental advantage develops as a result of this efficiency: a low melting flux that is a carcinogenic hazard has to be added to the conventional feed to the furnace. The flux is not required in Cromwell's process, however, because the relatively smaller amounts of dross formed on the surface of the melt can be controlled at a depth of 3/4" to 7/8" maximum. This oxide layer (dross) protects the liquid metal underneath, eliminating the use of flux. It is estimated that Mr. Cromwell's process may represent an energy savings of about 3.1 billion kilowatt hours per year.

Mr. Cromwell has now opened an aluminum dross processing plant in Buffalo, N.Y., secured $1.5 million in financing, plans to hire 50 employees in the near future, and has letters of commitment to purchase $10 million per year of recovered dross.

The above examples demonstrate the ability of individual and small business innovators to dedicate themselves to the solution of energy problems and to leverage a relatively small grant into significant business capital. But there are other successes - more examples of individual and small business innovators making landmark contributions to their industries.

- In December 1979, McKenneth Stofen was awarded a $53,000 grant for his "Air Cooled Compressor Heat Recovery and Heat Circulation System Plus Ambient Air Filter and Air Cleaner for Same Compressor." The inventor has developed an environmental barrier or envelope (Ecology Package) to contain the heat exchange surfaces and air intake for compressed air generation systems. The Department of Energy grant was awarded to Mr. Stofen to design and build the ecology packages and to test and gather data on the operations of air-cooled compressors with ecology packages. Air-Cooled compressors have the advantage over water-cooled compressors in that they: 1) eliminate requirements for cooling water; 2) can use heated air for space heat; and 3) require no sewage connection. At the 9th Annual World Fair for Technology Exchange, held March 10-13, 1981 in Atlanta, Georgia, Mr. Stofen's system was awarded first place in the Industry Division for "Significant Achievement in Technological Development."

- In June 1979, Mr. Melvin Sachs was awarded an $87,000 grant for his "U-Form Technology." The U-Form Technology uses rigid, lightweight aggregate insulation to provide the "form-works" for the concrete structural members of a building when it is completed. The technique is estimated to cut construction time by one-third or more and permits year-round workability of concrete without freezing. In one instance, Detroit Edision found the actual billings for total energy costs in a 120,000 square foot building in Livonia, Michigan (U-Form Headquarters) averaged only $0.63 sq. ft. for all energy consumed during 1978-79. This compares with

Detroit Edison's own projection of $1.00 to $1.25 sq. ft. for other thermally efficient but more conventionally constructed buildings. Sponsorship by the Energy Related Inventions Program was instrumental in U-Form receiving top honors in a competition for "significant achievement in technological development" at the Eighth Annual World Fair for Technology Exchange in Atlanta, February 1980 and is seen to be a significant factor in Mr. Sachs' increasingly successful marketing efforts.

- In December 1979, Mr. James Chill was awarded a grant of $124,000 for his "Process Development to Conserve Energy and Material -- (in the manufacture of) -- Bearings." Mr. Chill's invention is a methodology for continuously casting a sheet of the desire bearing alloy, in the desired thickness, casting it to the proper length, rolling it to the specified diameter, and welding it together. Mr. Chill's process thus reduces machining and other production costs. Also, the hot metal portion of the process can be completely isolated from the environment. Together with the reduction of machining operations, this drastically reduces environmental contamination from the highly toxic lead which is a key ingredient in most bearings.

  OSHA regulations (29CFR 1910.1025, Dec. 24, 1979) aimed primarily at open furnace melting of lead have placed stringent requirements upon the bearing industry.

  These requirements are roughly equivalent in stringency to the required isolated environment for handling of radioactive materials necessitating, for example, corresponding low air counts, clothing changes, and showers by workers before leaving the work area. Thus the bearing industry is faced with building altogether new facilities and adopting costly work procedures. Mr. Chill's new process is an economic alternative which makes the isolated environment condition easier and cheaper to attain than with conventional technology.

  At a January 21, 1981 hearing on the OSHA regulation, OSHA took the position that because of Mr. Chill's technology it was feasible for nonferrours foundries to abide by the subject standards.

As of September 30, 1981, NBS had evaluated 17,466 applications, with 191 recommended to DOE for further consideration. Results are summarized in the following table.

NBS Evaluation Progress Report
(Through FY 1981)

Classification	Requests Received	Completed Second-Stage	Recommended to DOE
[illegible]l Fuel Production	365	58	19
Direct Solar	2,056	64	14
Other Natural Sources	2,555	54	13
Combustion Engines & Components	1,977	72	13
Transportation Systems, Vehicles & Components	1,498	47	11
Buildings, Structures & Components	2,953	115	39
Industrial Processes	894	147	55
Miscellaneous	2,116	70	27
Out of Scope & Unclassifiable	3,052	0	0
TOTAL	17,466	627	191

Of the Energy-Related Inventions Program accomplishments to date, the following items are especially noteworthy.

- Nearly $9 million has been awarded in direct grants for 104 projects with an equal amount provided in indirect assistance.
- The National Congress of Inventor Organizations was created with support by DOE and NBS.
- Regional Information Resource Centers are being developed to diffuse innovative technology.
- Patent Depositories and University Innovation Centers are being supported.
- State-of-the-art automotive technical review memoranda have been provided for invention evaluations at NBS.

APPROPRIATE TECHNOLOGY SMALL GRANTS PROGRAM

The Appropriate Technology Small Grants Program provides grants for small-scale, energy related technologies that are "appropriate" to local needs and skills. The program was established in 1978 as a pilot effort in Federal Region IX (California, Nevada, Arizona and Hawaii) to enable individuals, small businesses, State and local agencies, local nonprofit groups, and Native American tribes to apply their skills to developing energy technologies that supplement, complement, or provide alternatives to large-scale technologies. Due to its initial success, the program was extended nationwide in 1979. The endeavor is authorized by Public Law 95-39.

SERVICES

The goals of the Appropriate Technology program are to:

- assist in the diffusion of energy related technology options available in the United States;
- provide access to the Federal government for individuals and groups that would not otherwise have contact;
- make available technology not otherwise accessible to the Federal government;
- further national efforts to promote the use of renewable resources and conservation of nonrenewable resources; and
- provide decentralized energy efficiency and renewable resource technologies.

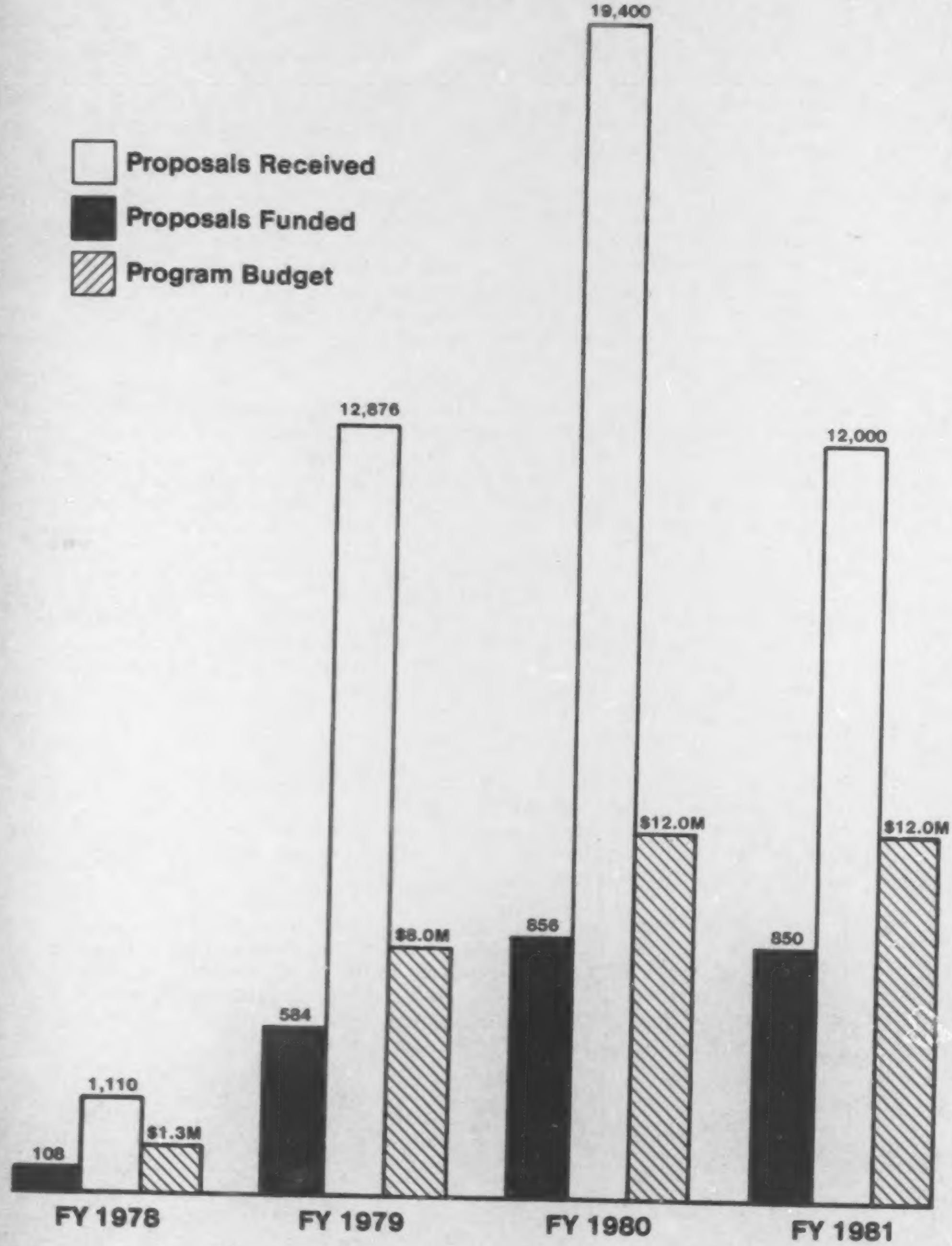
Individuals, local nonprofit organizations and institutions, State and local agencies, Native American tribes, and small businesses were eligible to apply for grants. Simple and straightforward procedures for grant application were established to ensure that all applicants received equal consideration. Application evaluators familiar with State, regional and local requirements and resources, made certain that projects selected for funding were responsive to local needs and concerns. In addition, every effort is made to notify all interested persons of program activities in their regions.

FUNDING

Appropriate Technology Small Grants amounted to $1.3 million in fiscal year 1978, $8 million in 1979, $9.7 million in 1980, and $12.0 million in fiscal Year 1981.

At the end of the fiscal year 1981 grant cycle, the Appropriate Technology program ended the awarding of new grants. The Department of Energy requested zero budget for the Appropriate Technology program in FY 1982. The Congress appropriated $2.88 million dollars to be used for grants monitoring and information dissemination activities only. Results of the Appropriate Technology Small Grants Program from FY 1978 through FY 1981 are summarized in the following graph:

Appropriate Technology Small Grants Program
Funding Levels



ACCOMPLISHMENTS

The program provided funds for a wide variety of projects, each falling into one of three categories.

1. Concept Development

   Awards of up to $10,000 were made for the development of an idea, concept, or investigative finding in areas ranging from new concepts of energy sources to the new application of existing procedures or systems. Examples of projects funded under this category follow.

   - A farmer in Nebraska received a grant to demonstrate an innovative idea which can be replicated at a low cost. The farmer has taken a gravel area, 90 feet by 10 feet, painted the gravel black and constructed a polyethelene tunnel above it. From a blower at one end of the tunnel, hot air is forced into an unheated barn that is used for drying grain. The solar tunnel replaces a propone gas heater which is no longer needed.

   - A nonprofit group in California has developed new designs for owner-built dry-composting toilets that operate on heat from solar ovens. The new design conserves both electricity and water. The waste drums incorporated in the system can be processed on a neighborhood basis, with the sludge used as fertilizer in public areas.

   - Agriculturists in Arizona are studying the possibility of producing Russian Thistle, which thrives in arid climates, as a biomass crop to be processed into artificial fireplace logs. Although this may involve considerable amounts of land, it appears that great water conservation, energy, economic, and environmental benefits would outweigh the costs.

2. Technology Development

   Awards of up to $50,000 were made for the development of a concept into a useful technology. This category included design, assembly, and laboratory testing to determine technological feasibility and application of a concept. Examples of projects funded under this category are:

   - The Brick Institute of America at Clemson University was granted $30,000 to construct seven buildings utilizing different types of brick and construction techniques. Based on the results of this project, the Institute will make recommendations on which technology is best suited to the requirements of passive solar design.

- Two individuals in Vermont assembled and tested a variety of small-scale, wood-fired steam plants for home electricity generation, with capability for adaptation to other uses.

3. Demonstration

Awards of up to $50,000 were made to test a technology under operating conditions to show that its commercial use is feasible. Demonstration projects include:

- A grant was awarded to implement a solar greenhouse construction workshop in Alabama. The community now has 25 greenhouses, some of which are being retrofitted for solar hot water heating.

- A grant was awarded for a project in Sioux City, Iowa where a Victorian style house built in 1893 was retrofitted in a demonstration entitled, "A Solar Assist for Older Homes." The demonstration proved that any home can incorporate solar heating and cooling for a low initial investment regardless of age, style, or size. The grantee is now running workshops throughout the community and building solar collectors for commercial applications.

- A project in Arizona State University to build and install low cost solar water heating systems ($400 - $500 per unit) through weekend workshops for homeowners has been expanded to other States through a cooperative effort involving three DOE State and Local Assistance Programs: 1) Appropriate Technology Small Grants; 2) State Energy Conservation Program; and 3) the Energy Extension Service. Arizona State University provided instructor training assistance to State Energy Offices or other State educational institutions so that they, in turn, were able to train individuals to build their own collectors.

An extensive Lawrence Berkeley Laboratory study of 20 Appropriate Technology projects concluded that for each $2 spent in this program, the equivalent of one barrel of oil can be saved. At the most conservative current crude oil price per barrel, this represents a savings-to-cost ratio of 15 to 1. The Laboratory study was expanded in 1981 to include more projects, and broadly evaluated the effectiveness of the program.

GRANTS MANAGEMENT AND TECHNICAL ASSISTANCE

In addition to divisions under the Director of State and Local Assistance Programs which have legislatively established programs, the Grants Management and Technical Assistance Branch provides cross-program direction, coordination, and administrative services in the areas of grant and financial management, information systems, technical assistance, planning, policy review, and evaluation.

Their mission is to increase the coherence, efficiency, and impact of State and Local Assistance Programs by identifying opportunities and performing the necessary activities required for consolidating and simplifying ongoing assistance and planning among State and local grant programs with collateral offices, DOE Operations Offices, and State and local agencies.

FUNDING

All funding for this office is provided, on an appropriately shared basis, by the legislatively budgeted program offices.

ACCOMPLISHMENTS

Since FY 1980, Grants Management and Technical Assistance has accomplished the following tasks.

- Assumed management of five technical support contractors developing: (1) workshops for State legislators; (2) standard guidelines for energy audits; (3) a Practical Materials Clearinghouse for States; (4) technical assistance for contingency planning; and (5) successful appropriate technology projects
- Assumed responsibility for revisions to proposed rulemaking and drafted a manual for coordinated State grant applications
- Set up a technical assistance backup and single point-of-contact for Operations Offices and States
- Arranged for a pilot test of the coordinated grants application process by the State of Florida
- Published a Compendium of Federal Legislation, Policies, and Procedures for State and local grant programs
- Initiated a management information system requirements study
- Set up a procurement tracking system

- Established an advance coordinated notification process to Operations Offices on planned meetings and publications
- Managed an all States meeting covering four principal grants programs
- Established coordination mechanisms with Operations Offices
- Developed effective technical assistance network supporting State and local needs
- Initiated integrated management information system providing program element data and cross-program integrated data for evaluation and State grant program administration
- Completed the pilot State coordinated grant process and initial training for all States to permit them to begin using the single-grant process in 1982
- Provided analysis of local government assistance needs and actions to address highest priority requirements
- Trained Operations Offices and States in technical assistance networking, grants and financial management, and energy information resources
- Developed further opportunities for coordination and streamlining State and local grant program operations, planning, and budgeting

For 1982, the Grants Management and Technical Assistance Branch has set the following major objectives.

- Report State recommendations for information projects through the balance of FY 1982
- Complete grants management information system providing financial history of grant and award amounts and updating procedures for Weatherization Assistance, Energy Extension Service, State Energy Conservation and Industrial Building Grants Programs
- Complete review of evaluation reports on the Weatherization Assistance, Energy Extension Service, State Energy Conservation and Institutional Building Grants Programs and provide the results of those evaluations to the States and other interested parties

- Implement a monitoring system for all State and Local Assistance Programs
- Complete training for States on establishing information centers and clearinghouses to replace those services previously supplied or supported by Federal funding
- Coordinate FY 1983 State and Local Assistance Programs Congresional Budget submission, Congressional Testimony, and financial operations

STATE ENERGY OFFICES

Alabama Department of Energy
25 Washington Avenue, 4th Floor
Montgomery, Alabama 36130

Alaska Division of Energy &
Power Development
7th Floor, Mackay Building
338 Denali Street
Anchorage, Alaska 99501

Office of Energy Programs
Office of Economic Planning
and Development
1700 W. Washington, 5th Floor
Phoenix, Arizona 85007

Arkansas Energy Office
One State Capital Mall
Little Rock, Arkansas 72201

California Energy Commission
1111 Howe Avenue
Sacramento, California 95825

Colorado State Energy
Conservation Office
1600 Downing Street
Denver, Colorado 80218

Under Secretary of Energy
80 Washington Street
Hartford, Connecticut 06115

Delaware Energy Office
56 The Green
P.O. Box 1401
Dover, Delaware 19901

D.C. Energy Office
Lansburgh Building, 5th Floor
421 8th Street, N.W.
Washington, D.C. 20004

Governor's Energy Office
301 Bryant Building
Tallahassee, Florida 32304

Office of Energy Resources
270 Washington Street, S.W.
Room 615
Atlanta, Georgia 30334

Guam Energy Office
P.O. Box 2950
Agana, Guam 96910

State Energy Office
Department of Planning and
Economic Development
P.O. Box 2359
Honolulu, Hawaii 96804

Division of Energy Resources
State House
Boise, Idaho 83720

Institute of Natural Resources
325 West Adams, Room 300
Springfield, Illinois 62706

Department of Commerce Energy Group
440 N. Meridian
Indianapolis, Indiana 46204

Iowa Energy Policy Council
Capital Complex
Des Moines, Iowa 50319

Kansas State Energy Office
214 W. 6th Avenue, Room 101
Topeka, Kansas 66603

Kentucky Department of Energy
P.O. Box 11888
Lexington, Kentucky 40578

Research and Development Division
Department of Natural Resources
P.O. Box 44396
Capitol Station
Baton Rouge, Louisiana 70804

Office of Energy Resources
State House Station No. 53
Augusta, Maine 04333

Maryland Energy Office
301 West Preston Street
Baltimore, Maryland 21201

Massachusetts Office of
Energy Resources
73 Tremont Street, Room 701
Boston, Massachusetts 02108

Michigan Energy Administration
Michigan Department of Commerce
P.O. Box 30228
Lansing, Michigan 48909

Minnesota Energy Agency
980 American Center Building
150 E. Kellogg Boulevard
St. Paul, Minnesota 55101

Mississippi Office of Energy
and Transportation
Department of Natural Resources
Suite 300, Watkins Building
510 George Street
Jackson, Mississippi

Missouri Energy Program
Department of Natural Resources
P.O. Box 176
Jefferson City, Missouri 65102

Montana Energy Division
Department of Natural Resources
32 South Ewing Street
Helena, Montana 59601

Nebraska Energy Office
P.O. Box 95085
Lincoln, Nebraska 68509

Nevada Department of Energy
400 King Street, Suite 106
Carson City, Nevada 89710

Governor's Council on Energy
2 1/2 Beacon Street
Concord, New Hampshire 03301

Department of Energy
101 Commerce Street
Newark, New Jersey 07102

Department of Energy and Minerals
P.O. Box 2770
Santa Fe, New Mexico 87501

New York State Energy Office
2 Rockefeller Plaza
Albany, New York 12223

North Carolina Department of Commerce
Energy Division
P.O. Box 25249
215 East Lane Street
Raleigh, North Carolina 27611

North Dakota Office of
Energy Management
State Capital
17th Floor
Bismark, North Dakota 58501

Office of Energy
NAURU Building, 5th Floor
Saipan, Mariana Islands 96950

Ohio Department of Energy
30 East Broad Street, 34th Floor
Columbus, Ohio 43215

Energy Conservation Services
Division
4400 N. Lincoln Boulevard
Suite 251
Oklahoma City, Oklahoma 73105

Department of Energy
102 Labor and Industries Building
Salem, Oregon 97310

Governor's Energy Council
1625 North Front Street
Harrisburg, Pennsylvania 17120

Office of Energy
Centro Gubernamental
Apartado 41089, Minillas Station
Santurce, Puerto Rico 00940

Rhode Island
Governor's Energy Office
80 Dean Street
Providence, Rhode Island 02903

Division of Energy Resources
SCN Center, Suite 1130
1122 Lady Street
Columbia, South Carolina 29201

Office of Energy Policy
Capital Lake Plaza
Pierre, South Dakota 57501

Tennessee Energy Authority
Capitol Boulevard Building, Suite 707
Nashville, Tennessee 37219

Texas Energy and Natural
Resources Council
200 East 18th Street
Austin, Texas 78701

Office of Statistics and Planning
Trust Territories of the Pacific
Saipan, Mariana Islands 96950

Utah Energy Office
3266 State Office Building
Salt Lake City, Utah 84114

Vermont State Energy Office
State Office Building
Montpelier, Vermont 05602

Office of Emergency and
Energy Services
310 Turner Road
Richmond, Virginia 23225

Virgin Islands Energy Office
P.O. Box 2996
St. Thomas
U.S. Virgin Islands 00801

Washington State Energy Office
400 East Union, First Floor
Olympia, Washington 98504

Fuel and Energy Division
Governor's Office of Economic and
Community Development
1591 Washington Street
Charleston, West Virginia 25311

State Energy Office
101 S. Webster Street
P.O. Box 7868
Madison, Wisconsin 53707

Energy Conservation Office
320 W. 25th Street
Capital Hill Office Building
Cheyenne, Wyoming 82002

STATEMENT OF HON. CHARLES H. PERCY, A U.S. SENATOR FROM THE STATE OF ILLINOIS

Senator PERCY. Thank you very much, Mr. Chairman, Senator Hatfield, for an opportunity to present my views on the proposed fiscal year 1983 conservation budget.

I want to compliment both of you for your long-time commitment and perseverance in promoting energy conservation, and also to thank you for the supportive help you have both provided to the Alliance to Save Energy which Hubert Humphrey and I founded about 5½ years ago, feeling that Government shouldn't do everything, that the private sector ought to be brought in as too big to leave out, and we formed an alliance that probably has the most powerful board in the United States today of industrial leaders, labor leaders, conservationists, consumers, some 35 to 40—we have just increased the size of the board over the 40 members. We have a budget of about a million dollars a year. Gregory Peck does all of the pro bona radio and television advertising.

The oil industry under Fred Hartley as the director has contributed about $300,000 a year, a phenomenon which the Minister of Energy in Great Britain said to me was unheard of any place in the world. They spend $300,000 a year to convince Americans to be more efficient and to use less of their product, and the dramatic reductions that we have made are creating a whole new source of energy. We are becoming more efficient by strengthening our national security, by lessening our imports from about 8½ million barrels a day to today 5 million barrels with a larger economy which is evidence that we have made dramatic improvement in the efficient use of energy and energy conservation, but the judgment of our board is that we have just barely tipped the iceberg. We have just barely begun.

Every single thing we do for conservation piles up and accumulates, compounding the efficiency with which we use any source of energy, regardless of what it is.

I am here today to raise some serious questions about the direction that we seem to be heading in the area of energy conservation, however, as related to Government activities.

As chairman of the Energy, Nuclear Proliferation, and Government Processes Subcommittee of the Governmental Affairs Committee, we have been deeply concerned about the structure and organization of the Department of Energy and the emphasis that the Department has placed on conservation. The subcommittee has a strong bipartisan consensus that more needs to be done in this area. We have held oversight hearings over the Department, and I have personally had a number of conversations recently on this subject with administration officials, but I can report no real results or success.

I think the position that some officials have been taking will ultimately prove a disservice to the President. It is time that we, particularly those of us in the Republican Party in the Senate that have leadership responsibilities, now stand up and say that we are strongly committed to promoting energy conservation and energy efficiency in America.

We are looked to by the world as pigs in this field. That is the exact phraseology some of my best friends in Japan who use energy so much more efficiently than we use. Sheik Yamani himself made a special trip to Dumbarton Oaks to address the entire 165 CEO's of the board of the Alliance to Save Energy to give one message—unless you begin to use our product which is depleting rapidly more efficiently, we have only the price mechanism to convince you that what you use up is a valuable resource that will run out.

In other areas of energy policy I think the record of this administration is quite good. The decontrol of oil in the President's first month in office, the remarkable progress in filling the strategic petroleum reserve, and the President's courage in vetoing the Standby Petroleum Allocation Act, all of these actions, some of which are politically unpopular, showed the type of fresh thinking and decisive leadership we need in energy policy.

In my mind, a logical next step would be to launch a major new conservation initiative, not warmed-over versions of past programs, but something new and creative. The purpose of the President's program for economic recovery is to get the economy moving again, to have strong, healthy industries, workers back in their jobs, and people who once again can afford to buy a house or a car. If industry can avoid wasting energy, our economy will be better off. There will be more profit, more money to be invested and circulated into the general economy. Similarly, if consumers need to spend less on energy they can spend more on goods and services, again priming the economic machinery.

I am a fiscal conservative, and at the same time I am strongly proconservation. The two terms mean very much the same thing—avoiding waste, cutting fat, promoting efficiency, trimming back on nonessentials. After all, the first 10 letters of the word "conservation" are identical to the first 10 letters of the word "conservative."

I am convinced that the President would subscribe to a sound, updated conservation program if one were proposed to him, something that the Department of Energy does not seem at this stage willing to do.

Energy conservation, is consistent with the President's goals, good for the country, and essential to a sustained economic recovery. No one can dispute these facts. The only question that remains is whether there is a need for Government help. Secretary Edwards and Assistant Secretary for Conservation and Renewable Resources Joseph Tribble, have repeatedly cited the study which they claim shows that Government programs have only accounted for 5 percent of the reduced energy consumption in this country, but the study they cite reaches an important conclusion which they seem to have ignored, that the bulk of conservation now occurring in this country has resulted from very simply a cut in the standard of living and quality of life for the American people. According to this study so highly touted by DOE officials, the response to higher energy prices has, I quote, "depressed labor productivity, lowered standards of living, changed lifestyles, slowed economic growth, aggravated inflation, and caused severe deprivation in some segments of society."

Is this the conservation strategy that the Department of Energy wants to promote, depressed labor productivity and lower standards of living? I cannot imagine that President Reagan would go along with such an approach. I think we need a much more positive strategy toward conservation, a Republican strategy the President can be proud of, one that stimulates labor productivity, improves the standard of living, speeds up economic growth, and reduces inflation rather than the reverse. I am confident that it can be done.

Just a week ago I held a hearing at Argonne National Laboratory at which over 1,000 people attended, individuals at the cutting edge of the research into new conservation and other energy technologies. Many of these people are facing the loss of their jobs due to DOE's lack of commitment to conservation, alternative technologies. When I asked the DOE witness, Alvin Trivelpiece, his views on conservation, he responded, and I quote, "Conservation doesn't create new energy," leaving the implication that conservation is less important than finding new sources of energy.

This is the kind of attitude we just can't afford to have. I will admit that building more atomic plants and all that is more dramatic and seemingly doing more, but energy can be created by conservation. That is, in the sum total we can have more available if we use what we have far more efficiently than we are now.

No one can doubt that making people pay the replacement cost of energy is an important way of getting people to conserve, but unless we are satisfied with a lower standard of living, this should only be part of our conservation strategy. I am not going to defend all Government conservation programs now in existence. There are some good programs, and others needing improvement, but even if Government programs accounted for 5 percent of reduced energy consumption as claimed by the Secretary, this would still be a very cost-effective use of tax dollars. It would amount to a savings to this country and taxpayers of $3 billion.

A number of experts in the field have said that 5 percent is on the low side. Eric Hirst of Oak Ridge National Laboratory has concluded that between 20 and 25 percent of the reduction in energy use in 1973 can be attributed to Government programs. This is the equivalent of approximately 80 large nuclear or coal-fired powerplants. This flies in the face of those DOE officials who stress energy production alone while discarding the contributions that conservation can make.

Neither this study nor the one cited by DOE is by any means conclusive. What is clear is that the DOE officials have been unwilling to undertake any serious analysis of the conservation issue. In the second volume to DOE's Sunset Review Analysis submitted to Congress in February, one item after the next is listed demonstrating past successes of DOE's conservation programs, yet DOE then draws the totally inconsistent conclusion that the program should be eliminated.

Department of Energy officials like Mr. Tribble and Mr. Trivelpiece do a disservice to the President and the country as a whole by continuing to ignore the contributions that conservation can make to our economy and our national security. I would almost say that Dr. LaFever would have done as much for human rights I regret to say as Mr. Tribble seems to do for conservation. With the title Assistant Secretary for Conservation, you cannot be an effective advocate for a program that is mandated by law when you sit there and defend a 97-percent cut in your budget. Could we cut our budgets in this committee or any committee 97 percent and still say we can do an effective job?

I'm sorry I have to say this. I have said it directly to Mr. Tribble before. We set that Department up in Governmental Operations. We asked them for their commitment for conservation. We thought we had received that pledge, and yet we see a de facto dismantling of that end of the Department now, and it is going right before our eyes. Those programs are right down the sewer right now, and it is happening in front of us before the Congress of the United States has had—it has only the authority. This is a statutory department, but the functions we can't sit there and carry out. They simply are not being carried out. They continue to ignore the calls for a more balanced energy budget, one that recognizes the importance of conservation.

A number of national organizations, notably the National Governors Association and the National Home Builders Association, have recently called on Congress and the President to actively seek a more balanced budget. Similarly, the Alliance to Save Energy has proposed a resolution calling for current level funding for conservation, and this consists of some of the hardest headed labor and management leaders in this country. They think it makes good sense to spend this money.

The chairman of the board of General Motors went up personally with me to call on the past Secretary of Energy to simply say you can't expect a small organization such as the Alliance to carry the load in this field which in almost all other countries is carried entirely by government, and they are way ahead of us in energy efficiency and energy conservation. We are wasting energy. It is going down the drain. We are not doing enough about it at the governmental level.

The Alliance board members include many highly respected businessmen, recognize conservation as totally consistent with and complementary to a conservative fiscal policy and the President's economy recovery program. At our last hearing last week at Argonne, a distinguished group of scientists, academics, and industrialists overwhelmingly stressed their support for energy conservation programs. Recent public opinion polls, including one that tallied an astonishing 19 million households, have shown strong public support for conservation, yet despite this, as I said, the Department of Energy proposed a 97-percent budget cut for conservation for fiscal year 1983 and is busily trying to dismantle the existing conservation program.

Over the last several months Secretary Edwards and Assistant Secretary Tribble made a number of commitments to me and other Members of Congress.

First, Secretary Edwards has assured us repeatedly that he would not cut back conservation programs until Congress has given its approval.

Second, at a hearing I held last December, he agreed to develop a set of new conservation initiatives. Finally, in an early hearing in July of last year, Assistant Secretary Tribble agreed to be an active advocate for conservation.

Let's look at the record to see how well they lived up to these three commitments. As to the first commitment, I would like to submit for the record a copy of a memo recently sent from Assistant Secretary Tribble to his staff office directors. The memo clearly indicates Mr. Tribble's intent to move forward in phasing out conservation programs based on fiscal year 1983 budget figures which have plainly not yet been approved by Congress, in my view, never will be approved by Congress. In other words, they are phasing it out before Congress has had a chance to act, and yet the commitment was clearly made, we will not cut these programs unless they are approved by Congress.

Let me read to you directly from the manual, and I quote, "Decisions must be made to reprogram fiscal year 1982 funds as appropriated toward phasedown or phaseout of programs in keeping with the fiscal year 1983 budget proposals." They are just proposals, and yet the programs are being cut down and phased out in effect de facto dismantled, before Congress and the Governmental Affairs Committee has even acted on the Government reorganization energy program.

Although the memorandum recognizes that Congress must be notified of any effort to reprogram funds, it appears that the Assistant Secretary for Conservation is bent on destroying what little morale is left among individuals in his conservation and renewables division. The Assistant Secretary himself points to this program in the memo by recognizing that the current rates of attrition in his division are running well ahead of previous projections, and by proposing yet another reshuffling of personnel. This simply I don't think should be tolerated by this subcommittee.

On the second commitment, developing a new conservation agenda, Mr. Tribble has repeatedly expressed a reluctance to undertake this simple, straightforward task, fearing that it would somehow be viewed as contrary to administration energy policy. These fears are totally without cause. I am not asking for a study proposing warmed-over regulatory programs. I am asking for some serious thought and new initiatives that Republicans can point to with pride.

At a recent Appropriations Subcommittee hearing Assistant Secretary Tribble agreed to develop plans for conservation programs at three different funding levels—$200, $300, and $400 million. I hope that the Assistant Secretary will carefully meet these requests, and that you, Mr. Chairman, and Senator Hatfield, will question Mr. Tribble today further on this issue.

Regarding the third unfilled commitment, one would think with all of the conservation programs being pared back and with no new initiatives under review Mr. Tribble would have had plenty of time to meet the citizen groups and others to promote conservation, yet little or no progress appears to have been made in this area, either.

Whether or not Congress approves the President's proposal to dismantle the Department of Energy, we must have a strong advocate for conservation in the Government, someone who is creative and capable of developing new cost-effective, nonregulatory approaches to conservation consistent with the President's program, someone with strong management capability who can see these conservation programs through in the face of personnel cuts and budget uncertainties.

I would like to have the confidence that Joseph Tribble will be this kind of Assistant Secretary, but our patience simply is probably running out at this point. Mine certainly is. My patience also runs thin when I see the way conservation is treated in the administration's fiscal year 1983 budget and how it is ignored in proposals to reorganize the Department of Energy.

It is time that the Republican majority at this end of town told the President that a great disservice is being done to him and our party by those in the administration who persist in this action, and that statement would be backed up by most of the business executives of this country who themselves in spending their dollars find that conservation is the fastest payback they can get for energy savings in their companies. If that is true for us, why isn't it true also for the Government as well?

It is often hard to get the public's attention on energy issues in the midst of an oil glut when prices are declining, but we had a similar glut in the midseventies when prices were steady at about $15 a barrel. Then came the 1979 oil shortage, and the long gasoline lines. We simply cannot afford to repeat that mistake.

In closing, I would like to share with you one cartoonist's rendition of the problem we face. We can see the American driver is thumbing his nose at the oil glut over here. He is in essence thumbing his nose at the need to conserve energy. The oil sheiks are delighted. They can't wait until we start guzzling gas again.

This cartoon is right on target. As a nation, we simply cannot afford to snub energy conservation any longer. Thank you very much, Mr. Chairman, for the opportunity to testify before you.

I would like to have the record kept open so that I can insert extracts from the last annual report of the Alliance to Save Energy which Mr. Humphrey classified when he accepted the cochairmanship as probably the most important single thing I will do in my lifetime. I don't know how many other things he said that about just the day before and the day before that, but until the end of his life he gave us his enthusiasm, his sense of conviction that this was a course we have to go on to change the habits and attitudes of 220 million people.

We have gone a long way, but it is not as a result of Government who will go even less if the policies that have been proposed to us are implemented in fiscal 1983 budget. We are gung ho to build all the dramatic new power structures. We have a $800 million budget for nuclear, but we can't find the pennies for conservation.

The payoff any businessman will say is far greater in conservation than it is in all these other exotic sources of new energy, all of which take energy to create energy. It just makes no sense at all, and I hope that we can work together.

I have tried to reason with the administration for a long time. Secretary Edwards was asked a year and a quarter ago to be consulting, one of seven Cabinet officials, consulting with the Alliance, but we simply are very disappointed so far in what they have done in this particular end of our business.

Thank you.

[The prepared statement and additional material submitted by Senator Percy follow. Testimony continues on p. 136.]

OPENING STATEMENT OF
SENATOR CHARLES H. PERCY
BEFORE THE
SUBCOMMITTEE ON ENERGY, CONSERVATION AND SUPPLY
COMMITTEE ON ENERGY AND NATURAL RESOURCES
HEARING ON
PROPOSED FY83 CONSERVATION BUDGET

March 30, 1982

Mr. Chairman, thank you for giving me the opportunity to present my views on the proposed FY83 conservation budget. I would first like to compliment the Chairman for his longtime commitment and perseverance in promoting energy conservation.

I am here today to raise some serious questions about the direction we seem to be heading in the area of energy conservation. As you may know, I am Chairman of the Energy Subcommittee of the Governmental Affairs Committee. My Subcommittee has a strong bipartisan consensus that more needs to be done in this area. We have held oversight hearings, and I have personally had a number of conversations recently on this subject with Administration officials, but we have thus far had little success. I think the position that some officials have been taking will ultimately prove a disservice to the President. It is time that we in the Republican Party stand up and say that we are strongly committed to promoting energy conservation. It is in this spirit I come to you today.

In other areas of energy policy, I think the record of this Administration is quite good. The decontrol of oil in the President's first month in office, the remarkable progress in filling the Strategic Petroleum Reserve, and the President's courage in vetoing the Standby Petroleum Allocation Act -- all of these actions, some of which were politically unpopular, showed the type of fresh thinking and decisive leadership we need in energy policy.

In my mind, a logical next step would be to launch a major new conservation initiative -- not warmed over versions of past programs, but something new and creative.

The purpose of the President's program for economic recovery is to get the economy moving again -- to have strong healthy industries, workers back in their jobs, and people who once again can afford to buy a house or a car. If industry can avoid wasting energy, our economy will be better off. There will be more profit and more money reinvested and circulated into the general economy. Similarly, if consumers need to spend less on energy, they can spend more on goods and services, again priming the economic machinery.

I am a fiscal conservative and, at the same time, I am strongly pro-conservation. The two terms mean very much the same thing -- avoiding waste, cutting fat, promoting efficiency, trimming back on the non-essentials. After all, the first ten letters of the word "conservation" are identical to the first ten letters of the word "conservative."

I am convinced that the President would subscribe to a sound, updated conservation program if one were proposed to him -- something the Department of Energy is not willing to do.

Energy conservation is consistent with the President's goals, good for the country, and essential to a sustained economic recovery. No one can dispute these facts. The only question that remains is whether there is a need for government help.

Secretary Edwards and Assistant Secretary for Conservation and Renewable Resources, Joseph Tribble, have repeatedly cited a study which they claim shows that government programs have only accounted for 5 percent of the reduced energy consumption in this country. But the study they cite reaches an important conclusion which they have ignored -- that the bulk of conservation now occurring in this country has resulted from, very simply, a cut in the standard of living and quality of life of the American people. According to this study so highly touted by DOE officials, the response to higher energy prices has, and I quote, "depressed labor productivity, lowered standards of living, changed lifestyles, slowed economic growth, aggravated inflation, and caused severe deprivation in some segments of society." Is this the conservation strategy the Department of Energy wants to promote? Depressed labor productivity and lowered standards of living? I cannot imagine that President Reagan would go along with such an approach.

I think we need a much more positive strategy toward conservation -- a Republican strategy the President can be proud of -- one that stimulates labor productivity, improves the standard of living, speeds up economic growth, and reduces inflation, rather than the reverse. I am confident this can be done.

Just a week ago, I held a hearing at Argonne National Laboratory at which over 1,000 people attended -- individuals at the cutting edge of research into new conservation and other energy technologies. Many of these people are facing the loss of their jobs due to DOE's lack of commitment to conservation and alternative technologies. When I asked the DOE witness, Alvin Trivelpiece his views on conservation, he responded and, I quote, "conservation doesn't create new energy...", leaving the implication that conservation is less important than finding new sources of energy. This is the type of attitude we just can't afford to have.

No one can doubt that making people pay the replacement cost of energy is an important way of getting people to conserve but, unless we are satisfied with a lower standard of living, this should only be part of our conservation strategy. I am not going to defend all government conservation programs now in existence. There are some good programs and others needing improvement. But even if government programs only accounted for 5 percent of our reduced energy consumption, as claimed by the Secretary, this would still be a very cost-effective use of tax dollars. It would amount to a savings to this country and taxpayers of 3 billion dollars. A number of experts in the field have even said that 5 percent is on the low side. Eric Hirst of

Oakridge National Laboratory has concluded that between 20 and 25 percent of the reduction in energy use since 1973 can be attributed to government programs. This is the equivalent of approximately 80 large nuclear or coal fired power plants! This flies in the face of those DOE officials who stress energy production alone, while disregarding the contributions conservation can make.

Neither this study nor the one cited by DOE is by any means conclusive. But what is clear is that DOE officials have been unwilling to undertake any serious analysis of the conservation issue. In the second volume to the DOE Sunset Review Analysis submitted to Congress in February, one item after the next is listed demonstrating past successes of DOE's conservation programs. Yet, DOE then draws the totally inconsistent conclusion that the programs should be eliminated.

Department of Energy officials like Joe Tribble and Al Trivelpiece do a disservice to the President and the country as a whole by continuing to ignore the contributions that conservation can make to our economy and our national security. They continue to ignore the calls for a more balanced energy budget -- one that recognizes the importance of conservation. A number of national organizations, notably the National Governors Association and the National Home Builders Association, have recently called upon Congress and the President to actively seek a more balanced energy budget. Similarly, the Alliance to Save Energy, which I chair, has proposed a resolution calling for current level funding for conservation. The Alliance's Board members, including many highly respected businessmen, recognize conservation as totally consistent with and complimentary to a conservative fiscal policy and the President's economic recovery program. At our hearing last week at Argonne, a distinguished group of scientists, academics, and industrialists overwhelmingly expressed their support for energy conservation programs. Also, recent public opinion polls, including one that tallied an astonishing 19 million households, have shown strong public support for conservation.

Yet, despite this overwhelming support, the Department of Energy proposed a 97 percent budget cut for conservation for FY '83 and is busily trying to dismantle the existing conservation programs.

Over the last several months, Secretary Edwards and Assistant Secretary Tribble made a number of commitments to me and other members of Congress. First, Secretary Edwards has assured us repeatedly that he would not cut back conservation programs until Congress has given its approval. Second, at a hearing I held last December, he agreed to develop a set of new conservation initiatives. Finally, in an earlier hearing in July of last year, Assistant Secretary Tribble agreed to be an active advocate of conservation. Let's look at the record to see how well they lived up to these three commitments.

As to the first commitment, I would like to submit for the record a copy of a memo recently sent from Assistant Secretary Tribble to his staff office directors. The memo clearly indicates Mr. Tribble's intent to move forward in phasing out conservation programs based on FY '83 budget figures which have plainly not yet been approved by Congress -- and, in my view, never will be approved by Congress. Let me read to you directly from the memo, and I quote, "decisions must be made to reprogram FY '82 funds as appropriated toward phasedown or phaseout of programs in keeping with the FY '83 budget proposal." Although the memo recognizes that Congress must be notified of any effort to reprogram funds, it appears that the Assistant Secretary is bent on destroying what little morale is left among individuals in his conservation and renewables division. The Assistant Secretary himself points to this problem in the memo by recognizing that the current rates of attrition in his division are running well ahead of previous projections, and by proposing yet another reshuffling of personnel. This cannot be tolerated.

On the second commitment, developing a new conservation agenda, Mr. Tribble has repeatedly expressed a reluctance to undertake this simple, straightforward task, fearing that it would somehow be viewed as contrary to Administration energy policy. These fears are totally without cause. I am not asking for a study proposing warmed-over regulatory programs. I am asking for some serious thought and new initiatives that Republicans can point to with pride. At a recent Appropriations Subcommittee hearing, Assistant Secretary Tribble agreed to develop plans for conservation programs at three different funding levels -- 200, 300, and 400 million dollars. I hope that the Assistant Secretary will carefully heed these requests and that you, Mr. Chairman, will question Mr. Tribble further on this issue.

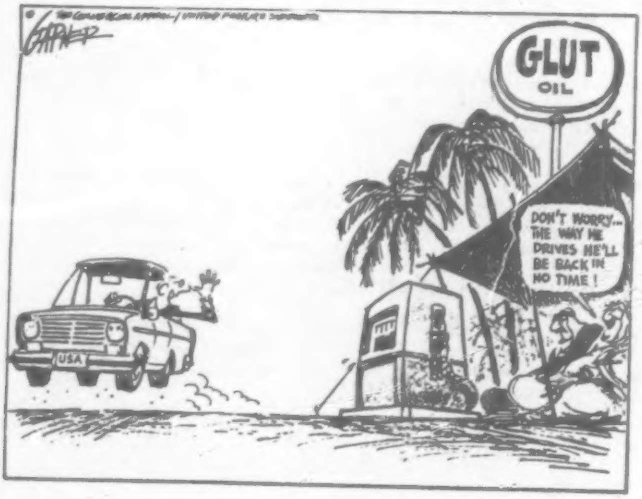
Regarding the third unfulfilled commitment, one would think with all of the conservation programs being pared back and with no new initiatives under review, Mr. Tribble would have had plenty of time to meet with citizen groups and others to promote conservation. Yet, little to no progress appears to have been made in this area either.

Whether or not Congress approves the President's proposal to dismantle the Department of Energy, we must have a strong advocate for conservation in the government -- someone who is creative and capable of developing new, cost-effective, non-regulatory approaches to conservation consistent with the President's program -- someone with strong management capabilities that can see these conservation programs through in the face of personnel cuts and budget uncertainties. I would like to have the confidence that Joseph Tribble will be this kind of Assistant Secretary, but my patience is running out. My patience also runs thin when I see the way conservation is treated in the Administration's FY '83 budget, and how it is ignored in proposals to reorganize the Department of Energy. It is time that the Republican majority at this end of town tell the President that a great disservice is being done to him and our Party by those in the Administration who persist in these actions.

It is often hard to get the public's attention on energy issues in the midst of an oil glut when prices are declining. But we had a similar glut in the mid-1970's when prices were steady at about 15 dollars a barrel. Then came the 1979 oil shortage and the long gasoline lines. We simply cannot afford to repeat that mistake.

I would like to share with you one cartoonist's rendition of the problem we face. As you can see, the American driver is thumbing his nose at the oil glut. He is, in essence, thumbing his nose at the need to conserve energy. The oil sheiks are delighted. They can't wait until we start guzzling gas again. This cartoon is right on target. As a nation, we simply cannot afford to snub energy conservation any longer.

Thank you, Mr. Chairman, for the opportunity to testify before you today.


© The Commercial Appeal / United Feature Syndicate
GARNER
GLUT
OIL
USA
DON'T WORRY... THE WAY HE DRIVES HE'LL BE BACK IN NO TIME!

DOE F 1325.8
(7-79)

U.S. DEPARTMENT OF ENERGY

memorandum

DATE MAR 1 6 1982

REPLY TO
ATTN OF CE-1

SUBJECT FY 1982/FY 1983 Manpower Utilization Planning

TO Deputy Assistant Secretaries
CE Staff Office Directors

The current rates of attrition are running well ahead of previous projections. Attrition rates are, unfortunately, not controllable by management. We can, however, take appropriate action to ensure that available resources are utilized as effectively and efficiently as possible, with emphasis on meeting highest priority program requirements. This requires an objective assessment of program priorities and resource needs. We recognize that, in many areas, action must be initiated promptly to bring to an orderly termination those programs scheduled for closeout this year. This will require some additional workload to process appropriate congressional and other notifications, as well as to conduct appropriate negotiations with contractors, subcontractors and other Departmental elements.

As vacancies occur in critical program areas, management must take action to reallocate resources from lower-priority activities. Such reallocations may require transfer of personnel across organizational lines throughout CE. In order to facilitate rapid identification of critical requirements, and provide a framework within which management can respond quickly and effectively, some advance planning is needed. Toward this end, you are asked to provide the following information:

1. Milestone (key activities) charts prepared in connection with the MBO tracking system should be updated to reflect implementation of FY 1982 in accordance with the proposed FY 1983 budget, where not already completed.

2. Key decision points on these charts should be highlighted where decisions must be made to reprogram FY 1982 funds as appropriated toward phasedown or phaseout of programs in keeping with the FY 1983 budget proposal. Given current requirements for advance notification to Congress on any such reprogramming, we must be able to identify these decision points as early as possible.

3. In addition, transfers of responsibility from Headquarters CE offices to other Headquarters, or field offices will require advance coordination and planning. Timeframes for such (potential) transfers should be noted on the MBO charts.

4. Manpower resource requirements in connection with key activities must be identified. Dates beyond which vacancies, if they occur, will not critically impair our ability to effectively manage the programs should be identified for each position in the organizational structure These dates would not imply that related personnel are "not needed" beyond that point, but only that a vacancy would not require immediate action to fill. The CE Position and Personnel Summaries recently provided to you by BAM should be annotated to reflect these dates.

Submissions relating to the above planning requirements should be provided to this office by close of business April 9, 1982. Questions should be directed to Linda Gregory, 252-9220.

Joseph J. Tribble

Joseph J. Tribble
Assistant Secretary
Conservation and Renewable Energy

APR 20 1981

Effects on Investment in Energy Conservation of DOE's Programs and of Market Forces

DRAF

by
Robert C. Marlay

Office of Policy, Planning and Analysis
U.S. Department of Energy
Washington, D.C. 20585

This paper addresses three points relevant to the current policy debate on energy end-use, conservation and the Federal role. These points are: (1) the effects to date of DOE's programs on investment in conservation, (2) the effects to date of natural market forces, mainly higher energy prices, and (3) the likely effect in the future of eliminating Federal programs, relying instead on market mechanisms. Estimating such effects is a complex business analytically, with many varying disciplinary approaches. This paper performs no new analysis, but attempts to summarize what information is available today. Some highlights are:

Effects of Federal Programs (Including Tax Credits)

- The effects to date of DOE's conservation programs ($781 million in FY 80) and tax credits ($620 million in FY 80) on national energy consumption are small, probably accounting for less than 5 percent of the observed reduction in energy use per unit of GNP. The effects on investment in energy conservation, however, may be larger (this is reasoned below), but still less than 15 percent of the total.

- This finding should not be unexpected. Many of the programs were not focused on the present or near-term, but on the longer-range future. Others were not even focused on conservation, but on such areas as emergency planning, energy impact aid and low-income assistance. In general, DOE's programs have focused on areas of alleged market failure where near-term payback, almost by definition, is expected to be marginal. Longer-term payback, however, particularly from R&D programs may be higher.

- Having had little effect on the whole does not mean that Federal programs are ineffective. Detailed cost-benefit analyses have shown that many of these programs are, indeed, cost-effective, some more so than tax credits. If some programs are not, others could take their place. The important issue is whether they are needed.

Effects of the Market (Price)

- The market has responded strongly to energy price signals. Significant energy savings have been achieved both by price-induced changes in consumption patterns (behavioral changes of a curtailment nature) and by investment in energy efficiency improvements. Curtailment actions appear to have dominated the market response to date. Energy efficiency improvements by way of capital investments have had secondary effects only.

- For this reason, the effects of Federal programs (including tax credits) on investment may be larger than their effects on energy consumption. Investment is believed to have accounted for a relatively small part (one-third or less) of the overall market response. To the extent that Federal expenditures have focused primarily on promoting investment rather than on curtailment, their leverage on this type of response may have been greater than on the whole. This area needs study.

- Curtailment of energy consumption, declining labor productivity, lower standards of living and slowed economic growth appear to be the predominant market response to higher energy prices, at least in the near-term (last seven years).

- Technology based energy efficiency improvements have made their largest contributions in two areas, increased fuel economy in automobiles and new plants in industry, but their effects are still of a secondary nature, even in their respective sectors, compared to price-induced curtailment actions.

- Investment in new technologies and turnover or modernization of existing capital stock are inherently much slower phenomena than behavioral decisions to do without. It should not be unexpected, then, that investment has had the lessor effect on the whole to date.

Expectations About the Future

- An energy conservation policy based solely on price will undoubtably reach a large and significant audience of potential investors in energy efficient technology. Whether they are sufficiently motivated by price to invest is a market decision, largely dependent on the cost of capital financing.

- The single most effective policy action the Federal government can undertake to promote energy conservation is to help bring down the high interest rates on capital. To this end, recent economic policy initiatives (reduced Federal spending and balanced budgets) may do more for energy conservation than all the programs and tax credits combined.

- o If high interest rates prevail, however, past behavior (the last seven years) will likely continue for some time into the future, that is, higher prices will induce further curtailment and more investment, but curtailment will continue to dominate the response.

- o For this reason, additional Federal initiatives aimed specifically at accelerating investment may be desirable. If they are, non-price market incentives (tax credits, accelerated depreciation allowances, etc.) may be warranted. Federal programs (other than tax incentives) may be warranted on similar grounds.

- o The existence, or lack thereof, of Federal programs aimed at accelerating investment can have a measurable effect. Their need, however, must be determined on the basis of demonstrated market failures.

- o Market failure in the past may have been caused, in part, by Federal price controls and, in part, by a general unfamiliarity with conservation technologies and their potential. These barriers are now being removed. To the extent that some Federal programs were motivated on this basis in the past, a reassessment of their need must now take place.

- o Lastly, many questions about the market, its responses, its strengths and weaknesses, and the role for Federal programs and incentives need to be examined more carefully. These are central issues in the current debate and should have priority on any analytical agenda for the coming year.

General Discussion

There is no doubt that the dramatic increases in energy prices since 1973 have had a profound effect on the U.S. economy. Today consumers pay, directly or indirectly, $400 billion a year for energy, 15 percent of GNP, and there is every sign that these costs will continue to rise faster than income in general.

One consequence of higher energy prices, to be sure, is reduced energy use per dollar of GNP. This ratio has declined by 13 percent since prices began to rise sharply in 1973. In earlier years, by comparison, energy and GNP appeared inseparable. As energy prices increase relative to other goods and services, there is a natural and expected market response to use less energy and, if possible, to substitute other goods and services instead.

DRAFT

The economic substitution of capital for energy through innovation, new or improved technologies and retrofit is one type of market response, often referred to as conservation or improved energy efficiency. In general, it means delivering the same energy service or comfort level with less energy and improved efficiency. There is also a second type of market response. This is the substitution of labor for energy or simply doing without. This is often called curtailment, self-denial, changing lifestyles or lowered standards of living. It is also called, confusingly, conservation.

Both types of market responses are operating (data is provided later). In the transportation sector, consumers are buying more efficient cars (improved energy efficiency) and driving less (curtailment). In the residential sector, homeowners are insulating their homes and lowering thermostats. In business, some industries are expanding with modern and energy efficient facilities, others are forced to shutdown. Obviously, millions of individual decisions must be made, many of them difficult ones, and the marketplace is particularly effective in bringing these about.

There is some evidence, however, that higher energy prices acting alone tend to evoke more of the curtailment type of market response than that which improves energy efficiency, especially in the shorter term. Technically speaking, the large increases in energy prices, combined with the pervasiveness of energy use in the economy in general, are believed to have caused a significant change in the preferred structure of the economy. The process of adjusting toward this new optimum has created a high demand for capital, driving upwards its price as well. As the prices of both energy and capital increase, there is a resulting shift in the economy away from both. The real price of labor, meanwhile, has remained constant or even declined slightly. The market response, predictably, is to use more of this input, driving down labor productivity. As labor productivity declines, by most measures, so does the standard of living.

The Effect of DOE's Programs

Although energy consumption per dollar of GNP has risen and fallen at various times in the post-war period, the recent downward trend is a marked departure from historical behavior. The 1980 estimate of 51,400 Btu's per constant (1972) dollar of GNP is substantially below that of any other time in the last 30 years. This reduction roughly translates into about 12 quads of forgone energy use, based on 1973 efficiency levels, or about $60 billion in 1980 energy purchases.

It is unlikely that Federal conservation programs, including tax credits, have had a significant effect at this scale. Most of these programs were intended to serve less immediate purposes. A breakdown of FY 80 expenditures shows where the emphasis has been.

	FY 80 Millions
Grants to Schools and Hospitals and Low-Income Persons	$ 342.7
State Planning Grants	98.8
Transportation (R&D and Info)	113.4
Buildings (R&D and Info)	103.4
Industrial and Multisector (R&D and Info)	79.3
Energy Impact Assistance	43.0
Total DOE FY 80 Expenditures	780.7
Corporate Tax Credits	190.0
Individual Tax Credits	430.0
Total Tax Expenditures	620.0

Approximately 40 percent of the DOE conservation budget in FY 80 was future oriented, focusing on research, development, demonstration and commercialization of high risk technologies. Such programs could have had little effect on either 1980 energy consumption or investment. Another 20 percent was of a planning nature, assisting state and local governments in preparing for energy emergencies, for the development of state energy management plans or for energy impact aid. These programs may have had some effect. The remaining 40 percent was in the form of grants to schools and hospitals and low-income persons for weatherization, intended primarily to offset the negative impacts of higher energy prices on specific segments of society rather than to motivate investment by the private sector. These programs have likewise had little effect on investment at the national scale.

Between 1975 and 1980, perhaps as much as $100 million (accumulated) has been spent on information or so-called outreach programs. These programs were intended to motivate investment and many have been effective. An evaluation of the Energy Analysis and Diagnostic Centers Program, for example, found that $5 of private investment actually resulted from each $1 of Federal outlay, with an additional two dollars planned for future years. Assuming an upper limit of $10 for $1, a total Federal expenditure of $100 million on outreach programs over several years could not have induced more than $1 billion in incremental private investment. Assume, furthermore, that

DRAF

all the other Federal programs induced an additional $1 billion in investment. Together, Federally induced investments above and beyond normal levels may have amounted to about $2 billion from 1975 to 1980. The energy savings resulting from these investments would be about $1 billion per year, or about 2 percent of the total 1980 response.

Residential and business tax credits for energy conservation have also induced investments. Treasury analysts assume only $1 of incremental investment for each $1 of tax credit. Others argue that the very existence of a tax credit stimulates interest in investments much more from a marketing point of view, than from a financial point of view. Conservation tax credit claims are projected for the 1980 tax year to be about $500 million for individuals and $200 million for corporations, implying a total conservation investment in that year of about $4.5 billion. Not all of this investment, however, was induced by the existence of tax credits. Much of it would likely have taken place anyway, without the tax credit. Assuming a $2-for-$1 effctiveness, tax credits may have induced $1.4 billion of incremental investment of the total of $4.5 billion in 1980.

Extending this analysis to tax years 1977, 1978 and 1979 (period affected), perhaps as much as $4 to $6 billion of accumulated incremental investment has been induced by the tax credits, so far. These investments would return, on the average, about $2 billion in energy savings per year. Adding this $2 billion (due to tax credits) to the $1 billion (due to information and other DOE programs), the combined effect to date would be about $3 billion per year, or about 5 percent of the total 1980 response ($60 billion).

Having had little effect upon the whole, however, is not to say that Federal programs have been "ineffective." The study of the Energy Analysis and Diagnostic Centers program, for example, shows that this type of focused program is two to five times more effective in motivating private investment (per dollar of Federal outlay) than the tax credits.

The real issue, then, is not so much one of effectiveness; less effective programs could always be replaced with more effective ones. Rather, it is whether Federal programs are needed at all, particularly in view of a large and apparently successful market response. This then shifts the focus of the debate, somewhat, away from the specifics of programs and measures of effectiveness, and more toward the market itself, its strengths and weaknesses.

DRAF

The Effect of the Market

If Federal programs, including those at the state and local level sponsored by the Federal government, account for less than 5 percent of the observed reduction in energy consumption per dollar of GNP, then the market must be responsible for the remaining 95 percent. Further, the apparent energy savings are sighificant, on the order of 12 quads. In this sense, the market has worked well, in both relative and absolute terms. Such savings could have been achieved only through a large collective response from millions of individuals. Price has undoubtedly motivated these actions and higher prices in the future will motivate even more.

In the context of the general discussion earlier, however, it is important to understand the specific nature of these actions. Some lead to fundamental improvements in energy efficiency, contribute to productivity, advance the Nation's economic growth and reduce future vulnerability to the negative impacts of embargo, disruption and energy price dictums. Others, however, force curtailment of energy use, depress labor productivity, aggravate inflation, change lifestyles, lower standards of living, cause severe deprivation in some segments of society and slow economic growth.

Knowing how much of each type of market response has taken place is relevant to the current debate because Federal programs which advance technology (such as research, development, demonstration and commercialization projects) and non-price market mechanisms which lower the price of capital (such as tax credits, financial incentives and direct assistance) are both targeted exclusively on promoting the first type of market response and obviating the second.

But what evidence is there to suggest how much of which is happening? The following paragraphs assemble some sketchy information on this question for each of three energy end-use sectors: transportation, residential buildings and industry.

In the transportation sector, some insight is gained by examining the case of the passenger automobile. Overall fuel consumption in 1980 was down 23 percent from a level that would have occurred had both travel behavior and automobile technology remained same as in 1973. For 1980 data, the breakdown is as follows:

Decrease in auto travel	9.6	percent
Decrease in travel speed	1.6	percent
Decrease in vehicle size (interior volume)	1.8	percent
Technology Improvements in car MPG	10.2	percent
Improved driver technique and owner maintenance	1.3	percent
Total Reduction below 1973 base case	24.5	percent

Of this breakdown, technology improvements in car MPG (miles per gallon) and better maintenance (tune-ups, tire pressure monitoring, etc) account for about one-half of the observed market response. The rest may be attributed to decrease in travel (reduced service), decrease in travel speed (substitution of personal time for energy) and decrease in vehicle utility as measured by interior volume (smaller cars).

In the residential area, energy consumption per household was about 12 percent lower in 1980 than it was in 1973. This is a significant change, but it is short of the 30 to 50 percent reduction DOE estimates is achievable -- with no decrease in services or comfort provided -- through cost-effective investments, averaging $2000 per household. Moreover, the 12 percent reduction appears to have been achieved largely by curtailment actions, rather than by investments in efficiency.

In gas-heated homes, for example, consumption for space heating was calculated by the American Gas Association to have been about 12 percent lower for the period 1972-1978 than for the period 1967-1972. AGA concluded that a large and variable behavioral component was involved, and that very little investment in retrofit had occurred.

AGA's conclusion is corroborated by other sources. Oak Ridge analysts, using EIA data, found that in 1977-1978 more than half of the U.S. households took no retrofit action. Similarly, IRS data show that only 7.8 percent of all households took advantage of the tax credit for residential conservation measures in 1978; the comparable figure for 1979 was 6.1 percent. The average investment claimed by these taxpayers, furthermore, was about $700, or about one-third the recommended level.

Together, these findings suggest that behavioral actions of a curtailment nature have dominated the residential sector's market response. The fraction of total savings attributable to investment in retrofit over the last seven years is certainly less than 40 percent and may be less than 20 percent.

DRA

In the industrial sector, 1980 energy consumption per unit of output (value added measure) was down more than 17 percent from that of 1973 base year efficiencies. Of this, the breakdown is estimated as follows:

Shift in output mix	8.0	percent
Continuation of 1954-1973 trends	6.7	percent
Accelerated improvements in energy efficiency	2.7	percent
Total reduction below 1973 base case	17.4	percent

The first category is a shift in structure of industrial sector output away from energy-intensive industries toward lighter manufacturing. This is believed to have been exogenously imposed on the sector by changing consumer demands away from energy-intensive goods they can no longer afford. The second is improved energy efficiency due to the addition of modern and more efficient facilities under normal growth conditions. These gains are consistent with long-term trends, even in times of declining energy prices. The third is accelerated energy efficiency, above and beyond normal trends, resulting from investment induced by higher prices.

The price induced response, therefore, is estimated to be that of the changed output mix, plus any accelerated energy efficiency improvements observed since energy prices began to rise sharply in 1973. Of the total market response in the industrial sector, less than one-fifth (2.7 percent of 17.4 percent) is attributed to accelerated investment in energy efficiency improvements.

Summary of Market Effects

In summary, the market has responded strongly and, perhaps, predictably to higher energy prices. It has not necessarily responded optimally from a policy point of view. Energy consumption has been reduced by as much as 12 quads from 1973 base year efficiency levels. This response is dominated by price-induced behavioral actions of a curtailment nature: reduce driving, lowered thermostats, non-heated rooms, changing consumer demand for industrial output and others. It has also depressed labor productivity, lowered standards of living, changed lifestyles, slowed economic growth, aggravated inflation, and caused severe deprivation in some segments of society. This type of market response can be expected to prevail for some time into the future and will likely become more prevalent as prices continue to rise faster than income.

DRAF

The large reductions in energy use per unit of GNP are not the result, primarily, of investments in technology. Of that portion of energy savings attributed to increased price, less than one-third and, perhaps, less than one-fifth, is due to investments in improved energy efficiency. Of these investment-type of responses, turnover of stock in the passenger automobile fleet and additions of new plants in industry appear to have contributed the most so far to improved energy efficiency; retrofit in industry and housing, the least.

Future Effects of Eliminating Federal Programs

In the longer-term, although not yet apparent from the experience of the last seven years, curtailment may give way to investment. Investment in new technologies and turnover or modernization of capital stock are inherently much slower phenomena than sudden decisions to simply do without. It should not be unexpected, then, that investment has had the lesser effect on the whole to date.

If high interest rates on capital prevail, however, investment in energy efficiency improvements will proceed even more slowly. Acceleration of investment, consequently, may be desirable. It has been linked to economic revival, improved labor productivity and the return to rising standards of living. If such arguments are convincing, then policy mechanisms could be installed in ways that are most effective for each sector or activity in the economy. Non-price market incentives such as investment tax credits and accelerated depreciation allowances, may be appropriate for some sectors. Federal programs, rather than market incentives, may be more appropriate in others, particularly in the areas of identified market failures or where tax-related incentives are not applicable.

If acceleration of investment is an objective, then presumably the best ways of achieving it can be found. Increased energy prices are beneficial means toward this end. Tax credits, if one believes the Treasury analysts, would appear to be somewhat ineffective, having low leverage (1:1 or 2:1) on incremental private investment per Federal dollar. Some DOE programs, if one believes the DOE analysts, would appear to be much more effective than tax credits, having higher leverage ratios, 5:1 or better.

While DOE programs have had little apparent effect on national energy consumption to date (less than 5 percent of observed savings), primarily for reasons of focus in time and purpose, they may have had a larger effect on investment. DOE's programs have focussed primarily on investment, hence, whatever impact they might have had on the whole may be attributed primarily to the investment portion. If the investment response is less than one-third of the whole, DOE's 5 percent of the whole may actually be 15 percent of the one-third.

A national energy conservation based solely on price, or on both price and non-price market incentives combined, without Federal programs, will likely reach a large and significant audience of potential respondants. The future effects of such a policy, however, are difficult to know. In general, the extent to which capital investments can be encouraged as energy prices rise, the more rapid the transformation of existing capital stock to new optimums and the less difficult and prolonged the period of adjustment.

The existence, or lack thereof, of Federal programs targeted on this objective can have a measurable effect on the rate of private investment. Whether or not Federal programs are advisable would appear to depend more on the issue of market failure and need, rather than on the issue of effect or effectiveness. If Federal action of one form or another is desired, then a subsidiary issue becomes important, that is, determining which programs or measures are more effective than others, per dollar of Federal outlay, whether they be program budget items or "tax expenditures."

Lastly, the marketplace is now in transition. Energy prices, in particular, have risen dramatically again in 1979 and 1980, oil has been decontrolled and natural gas price controls are gradually coming off. It is difficult to know whether market failures in the past will continue to be market failures in the future. Clearly, however, a thoughtful understanding of the market, its responses to price, its strengths and weaknesses, is a fundamental prerequisite to policy analysis. To this end, these issues should have priority on any analytical agenda for the coming year.

STAFF COUNTERS BELIEF THAT DROP IN ENERGY USE DUE TO MORE EFFICIENT USE

Contrary to popular belief, the drop in U.S. energy consumption is due more to individuals and companies reducing energy use than to an increase in the efficiency of energy use through innovation or technology, according to a recent DOE staff policy paper. The paper, written for top-level DOE officials and used to reorient departmental analysis of conservation policies and programs, indicated this may not have been anticipated by the Reagan administration.

Action by individuals, companies and others to reduce energy use – a response to high energy prices – has been accompanied by several negative effects, such as declining productivity, a lowered standard of living and "severe deprivation in some segments of society," the staff paper suggests. This contrasts to positive effects, such as improved productivity, that would be expected to accompany increased efficiency of energy use, according to the paper.

Sources recently said the paper has led officials in DOE's policy office to examine more closely the market response to high energy prices, the effects of such response, and the role of federal programs in the context of such response.

Paper intended for Edwards. The staff paper, entitled "Effects on Investment in Energy Conservation of DOE's Programs and of Market Forces," was written by Robert Marlay, who recently returned to DOE's office of policy, planning and analysis after studies at the Massachusetts Institute of Technology. The Marlay paper, completed in late April, was originally intended to be used to back up statements by Energy Secretary James Edwards that DOE conservation programs have had little effect in reducing energy consumption. Roger LeGassie, then acting head of the policy office, had asked for the paper as he and Edwards were preparing to go to Congress to defend the administration's FY-82 budget proposals for DOE.

Marlay said in the paper that DOE conservation programs, funded at $781 million in FY-80, and federal tax credits, worth $620 million in FY-80, accounted for less than 5% of the observed reduction in energy use/unit of gross national product and for less than 15% of the total investment in energy conservation that year. Marlay said this did not mean the programs and tax credits were not cost effective but rather that they did not have much effect in the near term. This is predictable since at least 40% of the DOE's conservation budget for FY-80 was future-oriented, focusing on rd&d of high-risk technologies, Marlay said.

But the Marlay paper contended that cost effectiveness of the conservation programs is not the real issue. The real issue, according to the paper, is whether the programs are appropriate in the context of market response to high energy prices.

According to Marlay, the market has been most responsible for reduced energy consumption, with consumers and industry responding to the high energy prices by curtailing energy use. Marlay defined curtailment as "the substitution of labor for energy or simply doing without" and said that this is confusingly referred to as conservation. Marlay asserted that conservation is "the economic substitution of capital for energy through innovation, new or improved technologies and retrofit" – in other words, increased energy efficiency.

The Marlay paper noted that industry has responded to high energy prices primarily by producing less-energy-intensive products rather than by retrofitting plants to produce the products more efficiently. Consumers, he said, more often curtailed driving than bought fuel-efficient cars and were quicker to turn down thermostats than to retrofit homes to conserve energy.

Marlay noted that increasing energy efficiency is a slower process than curtailment and predicted that if high interest rates do not decrease and other adverse economic conditions prevail, curtailment action will continue in response to high energy prices, as will accompanying negative effects. The Marlay paper indicated that federal programs may be called for to stimulate investment in improved energy efficiency, but it stopped short of stating this, urging instead a closer study of the whole issue of market response to high energy prices.

DOE STAFFERS LAST WEEK BEGAN A POLICY STATEMENT ON COAL SLURRY PIPELINES, according to informed sources. Those sources emphasized that the effort is in the very early stages and that it would be at least a month before Energy Secretary James Edwards sees the policy statement. Work on the statement originated in DOE's office of policy, planning and analysis, sources said.

As of last last week, sources said, the statement was only a two-to-three paragraph, vaguely worded support for coal-slurry pipelines, sources said. Those sources did add, however, that the statement, as now worded, expresses support for federal eminent-domain legislation and for state control over access to water.

THE GENERAL ACCOUNTING OFFICE (GAO) IS EMBARKING ON AN OVERVIEW REPORT OF DOE'S future in response to a request from Sen. Charles Percy's Governmental Affairs subcommittee. The report's release this September will precede the department's own sunset review by just a few months and will probably figure prominently in the debate on whether to revoke DOE's Cabinet-level status, sources affirmed. Earlier guidelines for the report called for an examination of DOE's relationship with the Federal Energy Regulatory Commission (FERC) and with the Synthetic Fuels Corporation (SFC). Recent consultations with Senate subcommittee staff, however, have resulted in a restructuring of the report. "It will be a thoughtful analysis of what we need . . . more of an overview," a Senate source said, adding that specifics won't be addressed. According to the source, a report devoted solely to the DOE-FERC relationship and the various problems with the support agreement may be forthcoming. Several reports on synthetic fuels and the SFC are expected this July.

ECONOMICS OF SHIFTING DOE POWER-MARKETING GROUP TO INTERIOR UNDER STUDY

The Interior Dept. is in the preliminary stages of determining whether any cost benefits would result from transferring five regional electric-power-marketing authorities from DOE to Interior, according to department sources.

There is reason to believe, Interior officials said, that some administrative and operating efficiencies could be achieved, if the Alaska, Bonneville, Southeastern, Southwestern and Western Area power administrations again became the responsibility of Interior. The shifting of the marketing authorities to DOE under the DOE Organization Act of 1977, at least initially, resulted in higher administrative costs at some facilities previously run solely by Interior, one official noted.

Interior: 'On hold.' Interior "is on hold" in taking a position on the matter, the source said, until policymakers have had a chance to review the situation. "DOE is going to have to stabilize a great deal more before we can get serious" about considering any transfer, the official added. Meanwhile, officials at DOE's office of power marketing coordination claim to have no knowledge of any plans to return the power-marketing authorities to Interior. Officially, both departments state that the issue has yet to be addressed.

However, one Interior staffer disclosed that his office "had been operating under the assumption early in the year that a quick reorganization [of the power authorities to Interior's Bureau of Reclamation] might materialize." But no official communications have been sent to Bureau of Reclamation staff, sources said. Nevertheless, staffers contended that restoring Interior's jurisdiction over the power authorities would make sense, since the power they market is generated chiefly from Interior Dept.-operated facilities. In addition, other strong ties exist between the power-marketing groups and the department, an Interior source stated.

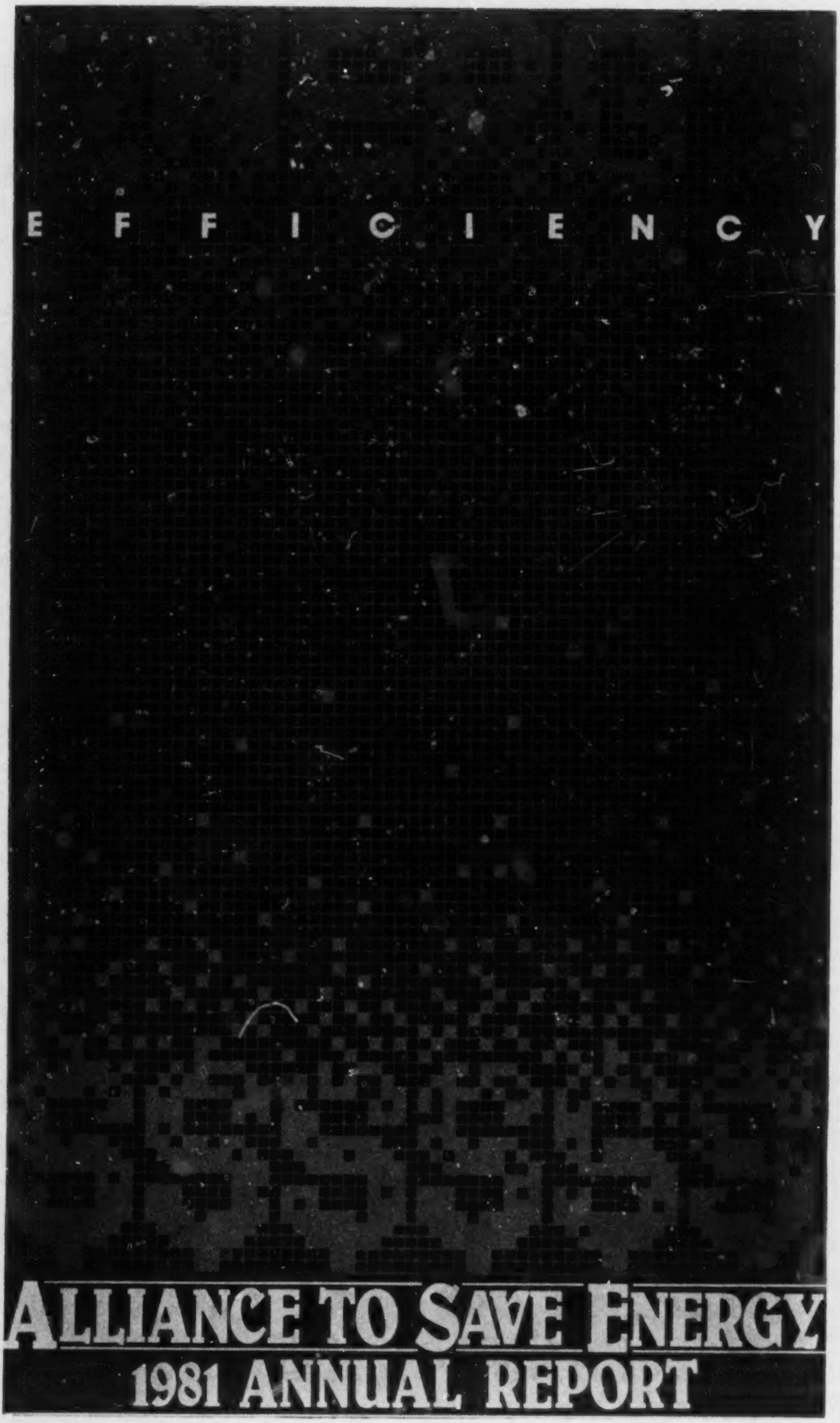
TELEPHONES
Subscription information:
Call (212) 997-6410 or
Toll-free 800-223-6180

News office:
474 National Press Bldg.
Washington, D.C. 20045
(202) 624-7380

Inside D.O.E. is published weekly by McGraw-Hill, Inc., 1221 Avenue of the Americas, New York, NY 10020. Corporate officers: Harold W. McGraw, Jr., president, chief executive officer and chairman of the board; Robert N. Landes, senior vice president and secretary; Ralph J. Webb, treasurer.

Managing Editor: Rob Doherty
Associate Editors: Lynn Stevens, Mark Crawford, Sam Rovit, Rod Kuckro

Subscription rates: $390/yr. in U.S. and Canada; $415 elsewhere (air mail delivered).
Copyright 1981 by McGraw-Hill, Inc. All rights reserved. Reproduction in any form whatsoever forbidden without express permission of the copyright owner
ISSN 0 149 5898



EFFICIENCY

ALLIANCE TO SAVE ENERGY

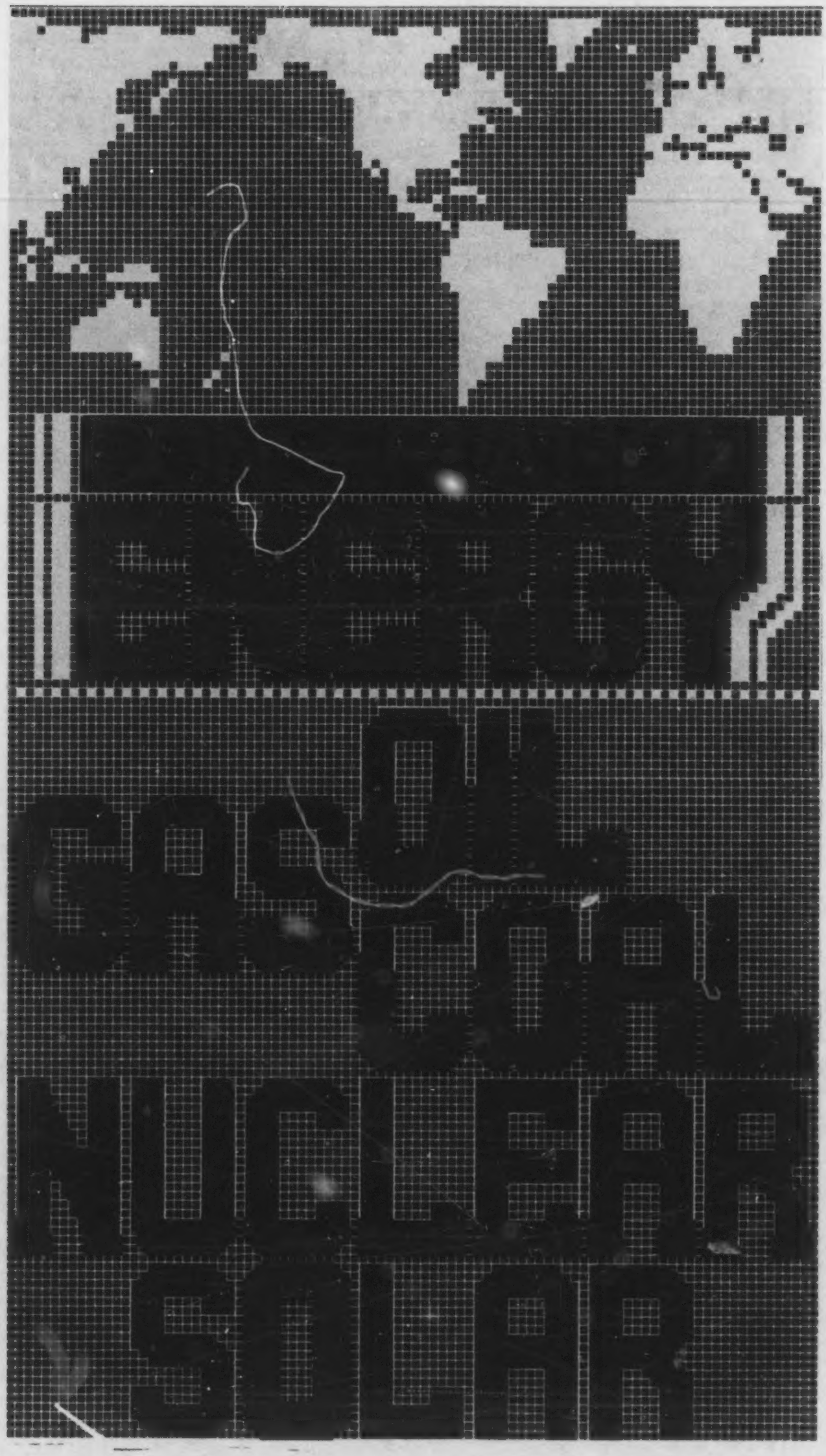
1981 ANNUAL REPORT

Contents

The Alliance
Purpose and Program Objectives 3
From the Chairman 4
Executive Director's Report 6
Alliance Programs 9
- *Investment in Energy Efficiency*
  Incentives and investment approaches which will stimulate investment in energy efficiency are being analyzed and promoted 10
- *Utility Investment Study*
  Engineering, economic and legal analysis of conservation opportunities to determine the lowest cost energy supply for a major utility is being conducted 11
- *Ridesharing*
  Investment in commuter vans is being encouraged to stimulate ridesharing 12
- *Home Energy Rating System*
  Design and implementation of a system to help change lending practices which unintentionally discriminate against energy efficient properties is in progress 13
- *Low Income Energy Assistance*
  Conservation assistance for low income households is being encouraged through federal LIEAP support 14
- *Advocacy*
  The Alliance is lobbying and participating in rulemaking to retain effective conservation programs 15
- *Natural Gas Decontrol*
  The Alliance advocates phased decontrol of natural gas with a windfall profits tax 16
- *Communications*
  Public education efforts continue through the Advertising Council campaign and a symposium on international cooperation in energy efficiency 17

Staff 18
Board of Directors and Honorifics 19
Board of Advisors 20
Financial Statements
Roster of Support 22
Audited Financial Report 24
Special Acknowledgements 28

ALLIANCE TO SAVE ENERGY
1981 ANNUAL REPORT


ENERGY
OIL
GAS
COAL
NUCLEAR
SOLAR

THE ALLIANCE

PURPOSE AND PROGRAM OBJECTIVES

The Alliance to Save Energy (ASE), founded in 1977 by Senators Charles H. Percy and Hubert H. Humphrey, is a non-profit, tax-exempt coalition of business, government, public interest and labor organizations dedicated to increasing the efficiency of energy use in the United States. From its inception, the Alliance has supported the belief that enhanced energy efficiency is essential to national security, economic stability and to the public welfare.

To many, energy conservation is interpreted as curtailment or a major change in daily life-style. Some relate conservation to sacrifice and personal hardship. The Alliance, however, takes a very different view.

The Alliance believes that energy conservation means focusing on increasing the efficiency with which we use energy. More efficient energy use in the home, the office or the industrial plant will enable us to achieve the same degree of comfort and level of output while saving money and reducing our dependency on foreign oil. Through energy efficiency investments, we increase the available supply of energy.

While new sources of energy are important for our future, energy efficiency has the greatest potential, in the short run, of increasing the available energy supply at the lowest cost. It is a source which is less expensive than importing oil, exploring for new oil and gas or generating electricity from nuclear power. Unfortunately, it is a supply source which has been underutilized.

The Alliance is committed to the belief that American business, government, labor and the public should cooperatively pursue this low-cost source of energy. In order to accomplish this goal, the Alliance has developed programs to identify and eliminate barriers which deter economically sound energy efficiency investment, and discourage the flow of capital into increased energy productivity. In an era of rising prices, the special problems of low income individuals are of particular concern to the Alliance.

"The Alliance believes that energy conservation means focusing on increasing the efficiency with which we use energy."

FROM THE CHAIRMAN

Robert Knudsen

My own views of the progress made in energy policy in 1981 permit me to be cautiously optimistic. First, oil imports were down to a record low for the past ten years of 5.9 million barrels per day. This compares with a 1980 level of 6.8 million barrels per day, and a 1977 level of 8.5 million barrels per day. The United States made a commitment to our International Energy Agency partners to never import more than 8.5 million barrels per day. The Alliance continues to monitor our progress against this goal, and it is cause for some optimism. Although we recognize that a portion of this reduction is due to reduced economic activity, most of it is directly attributable to conservation.

There were other signs besides a reduction in oil imports that indicated progress. The Alliance advocated oil decontrol, and it is now complete. In addition, a cumbersome federal allocation system is being dismantled, allowing marketplace forces to work. As a result, gasoline prices are actually a few cents lower than they were at this time last year. Supplies of crude oil also appear adequate, and there are even periodic reports of a "glut" of crude in the market.

These are all encouraging signs that energy conserving practices are taking hold and that short-term energy supplies and prices are stable. The work of the Alliance in advocating policies which will accelerate efficiency improvements has been critical to this trend. Our lobbying, research and information dissemination, including the enormously successful Advertising Council campaign with Gregory Peck, have had an impact on the nation's thinking and actions. But to be lulled into complacency or a false sense of security would be very dangerous. The work of the nation and the Alliance has just begun.

"I continue to advocate the need for aggressive, creative approaches to the production of conservation energy."

We are still primarily dependent on imported oil, a nonrenewable resource in critical demand throughout the developed and developing world. The United States' oil import bill last year was about $77 billion. These are dollars that could be put to better use fueling our domestic economy's revitalization. The situation is even more dangerous for developing countries, as our World Bank symposium hosted by Bank President and Alliance Director Tom Clausen underscored. The leadership of America in the matter of efficient energy use continues to be closely watched by our European allies, as well as by developing nations and Middle East exporters. Continued price stability and availability of supply rests on the West's moderation of its demand. At the same time, it will be our example and experience in producing the technological advances to use energy more efficiently over the next decade that will be replicated by nations industrializing for the first time.

The Alliance's work over the last year has sought to show that increased economic activity and growth and energy efficiency are compatible. In our work with the utility industry, the five most energy intensive industrial sectors, the transportation sector, and investors, we have convincingly shown that capital applied to reducing energy waste has yielded substantial returns. We will continue to work towards raising the awareness of these groups to the importance and cost effectiveness of continued investment in energy efficiency.

The Alliance has also addressed a great deal of its attention to the problems confronting low income individuals particularly hard hit by rising energy costs. Our furnace retrofit program, targeted to low income individuals, has shown that energy savings of twenty percent are possible through properly conducted retrofits. Programs such as this, aimed at permanent efficiency improvements, are wise uses of the taxpayers' energy assistance dollars.

Of great interest to the Alliance is the future direction of national energy policy. We continue to believe that a balanced energy policy is one which promotes energy efficiency as a viable source of supply. A barrel of energy used more efficiently continues to be the most cost effective, environmentally safe and readily available source of supply.

As founder and Chairman of the Alliance, as well as Chairman of the Senate Governmental Affairs Subcommittee on Energy, Nuclear Proliferation and Government Processes, I continue to advocate the need for aggressive, creative approaches to the production of conservation energy. I believe that we at the Alliance have pioneered such approaches in our work.

As a result, the Alliance has become an important presence in Washington. We have played a key role nationally and internationally in assuring that energy conservation is an essential element in any nation's balanced energy policy.

To our outstanding Board of Directors and staff, as well as our many contributors who have given both financial assistance and professional services, I extend my deepest thanks for seeing the Alliance successfully into its fifth year of operation.

Charles H. Percy

Senator Charles H. Percy, Chairman

EXECUTIVE DIRECTOR'S REPORT

Nancy O. Perry

As Senator Percy has noted in his Chairman's message, fairly dramatic progress in the reduction of oil imports has been achieved since the Alliance was founded five years ago. The price of OPEC oil stabilized this year at $34 per barrel. If this price holds until next January as OPEC plans, the real price of oil will actually fall by 10 percent in 1982. The causes for this stability are that short-term supplies are adequate and demand has slackened. This has in large measure been due to conservation.

On the surface, this would appear to be good news. Rapidly rising oil prices have been a major factor in both inflation and lost domestic economic opportunity. But, the danger implicit in a period of stable or declining oil prices is that it will cause the rate of investment in energy efficiency, and the development of sources of new supply, to slow in response to these "soft" oil market conditions.

This decline in the rate of investment has very serious implications for our long-term energy/economic outlook. As oil reserves decline, we must be aware that serious balance of payment and national security problems caused by dependence on imported oil will again be exacerbated. Conservation energy, frequently available to be tapped at less than $20 per barrel oil equivalent, is an investment that must not be put off. The basic investment needed to insure that our economy is prepared to function with greatly diminished oil supplies in the future must be made in this decade.

The best response to stable prices and adequate supplies is to use the incremental dollars that have been going, in the past, to finance increased oil costs, for investment in efficiency related improvements.

"Conservation energy, frequently available to be tapped at less than $20 per barrel oil equivalent, is an investment that must not be put off."

Unfortunately, the economic, as well as the psychological facts of life often cause an entirely different market and government policy response. For instance, investor's calculations on a rate of return on an energy investment include the future cost of barrels of oil offset. This means that substantially lower bottom line returns are produced by financial forecasts based on stable or falling oil prices, than on forecasts showing oil prices rising at or significantly faster than the rate of inflation. Governments also tend to de-emphasize energy as a priority issue in non-crisis times, as is now occurring in the United States.

The long-term implications of such a new set of government attitudes and market forces, coupled with the present tax and expenditure policy biases, could cause an actual decline in the rate of investment in energy efficiency and new supply. The Alliance's mission must be to see that this does not happen.

The Alliance is on record as favoring free market pricing (including gas decontrol). However, we also recognize that these same market forces, if not understood, may lull us into a dangerous complacency. This suggests a federal energy conservation effort even more active than it has been in the past, and redoubled Alliance efforts. We must pay particular attention to the hardships caused to low income households trying to cope with energy costs.

It has been the role of the Alliance, for the past five years, to build the constituency which recognizes the critical importance of energy efficiency in stabilizing domestic and international economies. We have pursued projects which have addressed the barriers to the full utilization of conservation energy and demonstrated how to overcome them.

There are literally hundreds of individuals who have contributed to make this effort a success during the past year. Each supporter, counselor, director and advisor knows the critical role that he or she has played in sustaining this organization. Of special note is the ongoing contribution of Director Fred Hartley and the efforts of our Finance Committee headed by Director Pete Peterson. Invaluable hours of consultation with the Alliance's research advisor, Director Bob Stobaugh, has insured that our projects are on solid ground. This year IBM joined our loaned executive program with two outstanding engineers, and Director Tom Clausen put the resources of the World Bank at our disposal for an international symposium on energy efficiency. The contributions of Directors Gene Pokorny and Cambridge Reports of an annual opinion poll, and Glenn Watts and the Communications Workers of subsidized rent are, again, greatly appreciated.

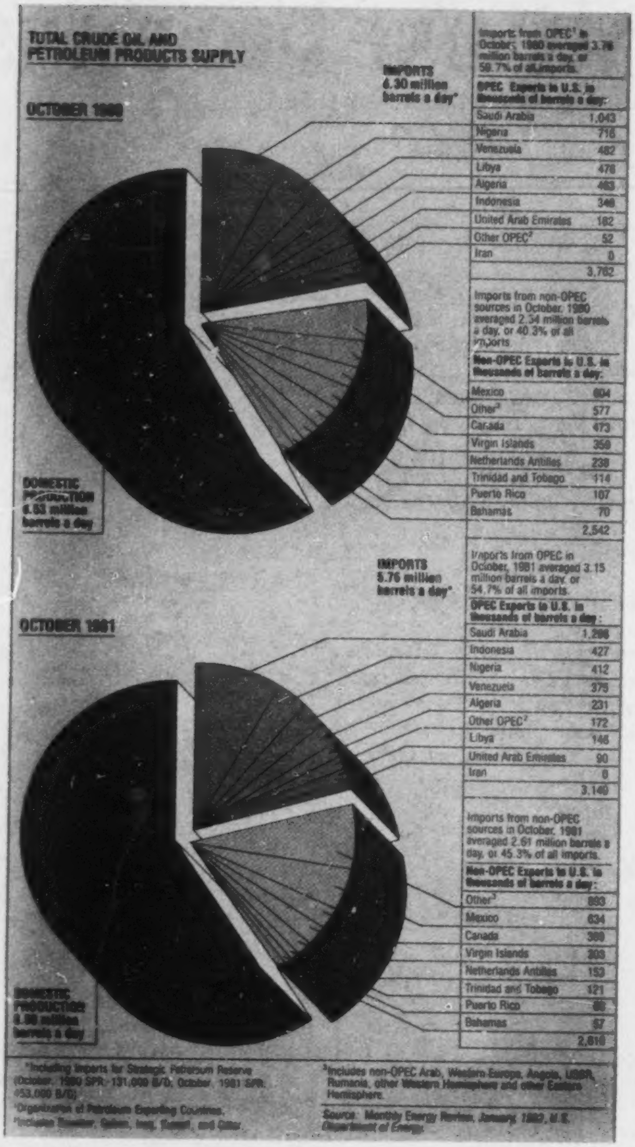
No annual report would be complete without my special expression of gratitude to my firm, American Telephone and Telegraph, which has so generously continued its support of me in this position with the Alliance.

I would like to extend my very special thanks to an exceptionally fine and hard working staff which pursues, with great dedication, an energy policy which we all believe to be in our nation's best interest.

And finally, without the continuing leadership of Senator Charles Percy, the Alliance's gifted Chairman, this effort would not have been possible. We have emerged, after five years, as a leading public policy organization due to his unswerving support.

Linda Gallagher

Linda Parke Gallagher, Executive Director.



TOTAL CRUDE OIL AND PETROLEUM PRODUCTS SUPPLY

OCTOBER 1980

Imports from OPEC[1] in October, 1980 averaged 3.76 million barrels a day, or 59.7% of all imports.

OPEC Exports to U.S. in thousands of barrels a day:	
Saudi Arabia	1,043
Nigeria	716
Venezuela	482
Libya	476
Algeria	463
Indonesia	348
United Arab Emirates	182
Other OPEC[2]	52
Iran	0
	3,762

Imports from non-OPEC sources in October, 1980 averaged 2.54 million barrels a day, or 40.3% of all imports.

Non-OPEC Exports to U.S. in thousands of barrels a day:	
Mexico	604
Other[3]	577
Canada	473
Virgin Islands	359
Netherlands Antilles	238
Trinidad and Tobago	114
Puerto Rico	107
Bahamas	70
	2,542

OCTOBER 1981

Imports from OPEC in October, 1981 averaged 3.15 million barrels a day, or 54.7% of all imports.

OPEC Exports to U.S. in thousands of barrels a day:	
Saudi Arabia	1,296
Indonesia	427
Nigeria	412
Venezuela	375
Algeria	231
Other OPEC[2]	172
Libya	146
United Arab Emirates	90
Iran	0
	3,149

Imports from non-OPEC sources in October, 1981 averaged 2.61 million barrels a day, or 45.3% of all imports.

Non-OPEC Exports to U.S. in thousands of barrels a day:	
Other[3]	893
Mexico	634
Canada	369
Virgin Islands	303
Netherlands Antilles	153
Trinidad and Tobago	121
Puerto Rico	86
Bahamas	57
	2,616

*Including imports for Strategic Petroleum Reserve (October, 1980 SPR: 131,000 B/D; October, 1981 SPR: 453,000 B/D)

[1] Organization of Petroleum Exporting Countries.

[2] Includes Ecuador, Gabon, Iraq, Kuwait, and Qatar.

[3] Includes non-OPEC Arab, Western Europe, Angola, USSR, Rumania, other Western Hemisphere and other Eastern Hemisphere.

Source: Monthly Energy Review, January 1982, U.S. Department of Energy.

ALLIANCE PROGRAMS

To advance its goals, the Alliance conducted an integrated program of public policy research and advocacy, demonstration projects, and public education during 1981. Among the projects initiated or continued this year are those which:

(1) identify incentives and develop mechanisms to accelerate investments in projects which increase industrial energy efficiency;
(2) evaluate the potential for reducing oil or the need to convert to coal in a utility through innovative financing and support for energy efficiency investments within a utility's service area;
(3) develop an effective marketing process for ridesharing agencies and analyze financial incentives for vanpooling entrepreneurs;
(4) encourage states to utilize federal Low Income Energy Assistance Program (LIEAP) monies for furnace efficiency improvements;
(5) increase consumer awareness of low cost home energy conservation methods through a public service Advertising Council campaign featuring Gregory Peck.

The following pages explore in depth the Alliance's programs which seek to reduce America's dependency on foreign oil (see opposite page) and to improve our use of traditional energy sources through energy efficiency. The Alliance's agenda extends to all sectors of the American economy—industrial, commercial, residential, and transportation—as efforts are made to encourage energy efficiency investment.

PROBLEM:

Barriers to investments in energy efficiency

ASE RESPONSE:

Analyze and promote incentives and investment approaches to stimulate investment in energy efficiency

Current federal tax and expenditure policy promotes energy production and does comparatively little to encourage energy efficiency. For example, if preferential tax benefits and federal expenditures are considered, the nation will spend approximately twelve times as much in 1982 to promote energy supply investments as it will to encourage conservation investments.

Alliance lobbying efforts focused on increasing subsidies for energy efficiency. In testimony before the Congress, Alliance representatives have repeatedly underscored the importance of residential and business energy tax credits as a method of increasing the incentives in the short run, and have advocated a phase-out of incentives for both production and efficiency in the long term. Since conservation energy is the least expensive and fastest way to produce "new" energy, adopting this strategy will enable us to produce our energy supplies at the least cost.

ASE's Industrial Energy Efficiency Project, funded by the John D. and Catherine T. MacArthur Foundation, seeks to document information on how incentives may influence a firm's decision to invest in energy efficiency. Current law allows companies to receive a ten percent energy tax credit (in addition to the regular investment tax credit) on a limited number of qualifying investments. However, the credit is due to expire at the end of 1982. The Alliance is analyzing the effectiveness of the credit as well as other incentives designed to encourage investment in energy efficiency through interviews and case studies of companies in each of the five most energy-intensive industries: steel, aluminum, chemicals, pulp and paper, and petroleum refining. Actual investment decisions are traced through the corporate decision process, and the effects of incentives on the company's current list of potential conservation investments are evaluated. By understanding issues such as the relationship between strategic planning and capital allocation, the comparison between energy related investments and other investment opportunities, and management attitudes toward third party financing, the Alliance will be able to formulate incentives which can encourage energy efficiency investments.

The viability of limited partnerships, and other financial arrangements, as mechanisms to increase the available capital for energy efficiency investments is being analyzed in an ASE feasibility study sponsored by the Department of Energy. Due largely to the scarcity of capital, conservation investments with attractive payback periods in the commercial and industrial sectors are frequently not made. The Alliance study is examining the organizational, legal and tax aspects of using limited partnerships to encourage the movement of third party capital into these investments. The few existing third-party financing arrangements are being analyzed, and the study is focused on extending the third party concept to financing investments which improve the efficiency of processes in the industrial sector. Third party investments in industrial process changes have enormous potential for energy savings but have not been attempted to date because of their complexity.

The Alliance will document the findings of the feasibility study in a report which will be available in the spring of 1982.

> ***". . . conservation energy is the least expensive and fastest way to produce 'new' energy. . ."***

PROBLEM:

Barriers to electric utilities tapping energy efficiency

ASE RESPONSE:

Perform engineering, economic and legal analysis of conservation opportunities to determine the lowest cost energy supply for a major utility

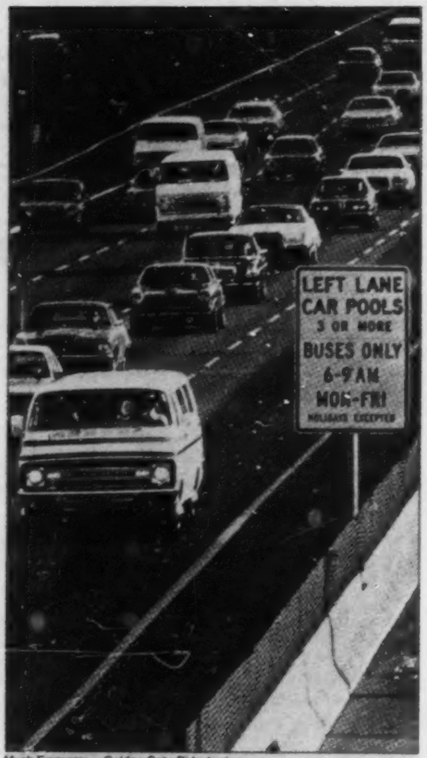
Part of the answer to reducing utility operating costs and the increasing costs of electricity paid by consumers may lie in major investments in conservation. The John A. Hartford Foundation is funding an Alliance study designed to determine whether rate payers, as well as the utility, would benefit more from a utility's investment in conservation or alternative investments in cogeneration or converting its generator from oil to coal.

Working cooperatively with the Arkansas Power and Light Company (AP&L), Alliance engineers, economists and attorneys are identifying conservation opportunities in the residential, commercial and industrial sectors and are analyzing barriers to their implementation. Twenty major commercial and manufacturing industries are being investigated for energy conservation opportunities. On-site visits precede the detailed engineering analysis of the energy savings of each conservation opportunity. An economic analysis of the likely market potential and penetration of each energy conservation opportunity under several financing alternatives is conducted. The costs and impact of the conservation opportunities for the commercial and manufacturing industries are evaluated with residential sector opportunities to generate one or more conservation investment strategies. The cost and benefits of this strategy are then compared to cogeneration and oil-to-coal conversion.

The study is guided by a prestigious advisory committee chaired by Dr. Robert Stobaugh, Director of the Energy Project at Harvard Business School and composed of William McCollam, President, Edison Electric Institute; Dr. James Plummer, President of QED Research; Dr. Pradeep Gupta, Director, Energy Analysis Department, Electric Power Research Institute; Ed Berlin, attorney, Leva, Hawes, Symington, Martin and Oppenheimer; Ralph Mitchell, Vice President, Conservation and Renewable Resources, Arkansas Power and Light Company; Curt Biren, Energy Director, The John A. Hartford Foundation and William H. Bowen, President, Commercial National Bank, Little Rock, Arkansas.

If the final report, due in 1982, demonstrates that the conservation strategy will provide a lower cost delivery of electricity to AP&L's customers, the Alliance will seek to have the plan implemented and will identify other utilities which may potentially benefit from adopting a similar analytical approach.

Ellen Morgenstern



Mush Emmons — Golden Gate Ridesharing

PROBLEM:

Inefficient energy use by commuters

ASE RESPONSE:

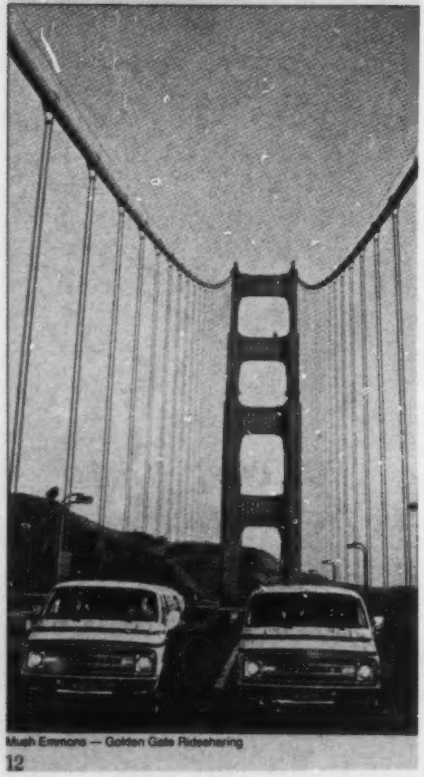
Stimulate ridesharing and encourage investment in commuter vans

America's energy consumption is critically tied to our dependency on the automobile. It has been estimated that almost one out of every nine barrels of oil used in the world is burned as gasoline on America's highways. The car uses the bulk of the transportation sector's energy and despite conservation efforts to date, 78 percent of all Americans still drive alone to work.

Ridesharing offers one of the most promising and cost effective ways to help reduce our oil imports. Each commuter vanpool, for example, saves an average of 5,000 gallons of gasoline a year, and represents a significant reduction in commuting costs, especially for those who live more than 20 miles from work. While these "long distance" commuters make up 13 percent of the total commuting population, they consume 68 percent of all gasoline which is used for commuting.

The Alliance is now engaged in a ridesharing demonstration project designed to 1) increase commuter ridesharing through improved marketing and 2) encourage investment in van ownership by individual vanpool operators or third party investors.

Based on experiences with Golden Gate Ridesharing in California, the Alliance has developed a marketing-strategy planning process to help ridesharing agencies improve their marketing efforts and attract more commuters. The Alliance will assist these agencies in adopting this planning process as a standard operating procedure through training workshops and a marketing strategy guidebook. In addition, ASE is providing information to potential entrepreneurs on the tax benefits and profitable financial returns of owning and operating a vanpool.



Mush Emmons — Golden Gate Ridesharing

Vanpools crossing the Golden Gate Bridge in California.

PROBLEM:

Mortgage lending practices which discourage the construction of energy efficient homes

ASE RESPONSE:

Design and implement a system to help change lending practices which unintentionally discriminate against energy efficient properties

Current lending guidelines and appraisal procedures ignore the fact that, all things being equal, a borrower purchasing an efficient house will spend less on energy and have more money available to repay his or her mortgage debt. These lending practices discourage builders and homeowners from adding energy improvements to their properties because only the higher initial cost and not the energy saving benefits are recognized by lenders, making it more difficult to qualify buyers for mortgage loans.

Residential properties consume 20% of all energy used in the United States. It has been well documented that home energy efficiency improvements can decrease consumption by more than 50%. However, according to The National Association of Home Builders, every extra $500 that a builder adds to the price of a $64,000 home for such improvements means that under present lending guidelines an additional 143,000 families cannot qualify to buy it. Under this program the fuel cost savings from energy efficient features would be acknowledged in qualifying buyers.

Many lenders and appraisers are willing to alter their procedures to recognize the benefits of an energy efficient property. But an easy and equitable method for comparing the energy efficiency of homes must first be developed and endorsed by the secondary mortgage market. ASE is working with the Department of Energy, primary lenders, the Federal Home Loan Mortgage Corporation (a secondary market organization which establishes the guidelines used by the majority of mortgage lenders), and the U.S. League of Savings Associations, to identify methods of providing energy information and to demonstrate how it can be used by home buyers and sellers, as well as lenders and appraisers.

> ***". . . an easy and equitable method for comparing the energy efficiency of homes must be developed. . . ."***

PROBLEM:

Impact of rising energy costs on the poor

ASE RESPONSE:

Encourage conservation assistance for low income households

Four million low income homeowners in the United States heat with fuel oil, for which they are now paying over a dollar per gallon. As prices continue to rise, those in colder climates are confronting severe hardships.

Since 1976, Congress has authorized a series of energy crisis assistance programs. However, since they exclusively offered cash assistance, only short-term help was available in paying escalating energy bills.

Due in large measure to the efforts of the Alliance, the $1.8 billion 1982 Low Income Energy Assistance Program (LIEAP) affords states a unique opportunity to begin to develop comprehensive energy assistance programs for the poor, combining direct payments for fuel and conservation assistance. The 1982 LIEAP permits states to spend 15 percent of their LIEAP grants for conservation, including heating system retrofit.

A pilot program involving permanent efficiency improvements to the oil furnaces of 200 low income families in Philadelphia was recently completed by the Department of Energy with the support and assistance of the Alliance and showed an average reduction of 20 percent in fuel use resulting from a $500 retrofit. This retrofit pays back far more quickly than most other conservation measures. A retrofit program based on the Philadelphia experience would pay for itself in three years, and would provide considerably more assistance than would a cash subsidy alone.

The flexibility allowed by the Administration in the 1982 LIEAP program provides an unprecedented opportunity to develop a more effective solution to the problem of energy and the poor. Unfortunately, in the absence of outside assistance, many states may not take advantage of this new program flexibility. The problem may be further complicated if states assume increased responsibilities under the Administration's block grant proposal.

The objective of current Alliance efforts is to assist a number of states in incorporating an oil-furnace retrofit component into their overall strategy to address the energy needs of their low income citizens. The Alliance has obtained a Ford Foundation grant to begin this work. Additional funding is now being sought to implement the program in ten of the top oil consuming states.

"The 1982 LIEAP permits states to spend 15 percent of their LIEAP grants for conservation, including heating system retrofit."

PROBLEM:

Decreased federal support for effective energy efficiency programs

ASE RESPONSE:

Lobbying and participating in rulemaking to retain effective conservation programs

The Alliance believes that a balanced energy policy recognizes that increased energy efficiency as well as new sources of production can provide significant additions to our energy supply. In light of institutional barriers, inadequate consumer information and other market imperfections, however, market forces alone will not bring about increased energy efficiency as rapidly as is desirable. The federal government must continue to play a primary role in encouraging energy efficiency.

During the past year, therefore, the Alliance lobbied to insure that effective energy efficiency programs were continued at adequate funding levels. In testimony before Congressional committees, in comments on proposed administrative regulations, and in meetings with key officials, the Alliance was instrumental in retaining important programs which are designed to reduce our nation's energy consumption.

The Alliance prepared and widely circulated a detailed analysis of the effectiveness of federal energy efficiency programs. This analysis included an evaluation of the positive impact of increased energy efficiency on this country's ability to compete in international trade and preserve American industry and jobs. It also included a detailed evaluation of federal efforts, 1) to promote the weatherization of schools, hospitals, and residential buildings, and 2) to provide research and development funds and information on more energy-efficient building systems, automobiles and industrial processes. This analysis supplied much of the supporting data to justify the continuation of many efficiency programs.

The Alliance submitted extensive comments in rulemaking proceedings on two DOE programs, Appliance Standards and the Residential Conservation Service (RCS). The Alliance supported the enactment of federal standards for major appliances. These standards were considered necessary because consumers frequently do not consider the future costs of energy in making purchases, and major appliances are frequently not purchased by the ultimate user.

The Alliance also commented upon DOE's proposed changes to RCS. RCS, mandated by legislation in 1978, required that major utilities provide residential energy audits for customers. These audits offer customers an opportunity to receive professional advice on methods of reducing home energy costs through simple low cost measures and conservation investments which have a reasonable payback period. The result of decreased customer energy use makes it less likely that utilities will have to engage in capital-intensive new plant construction.

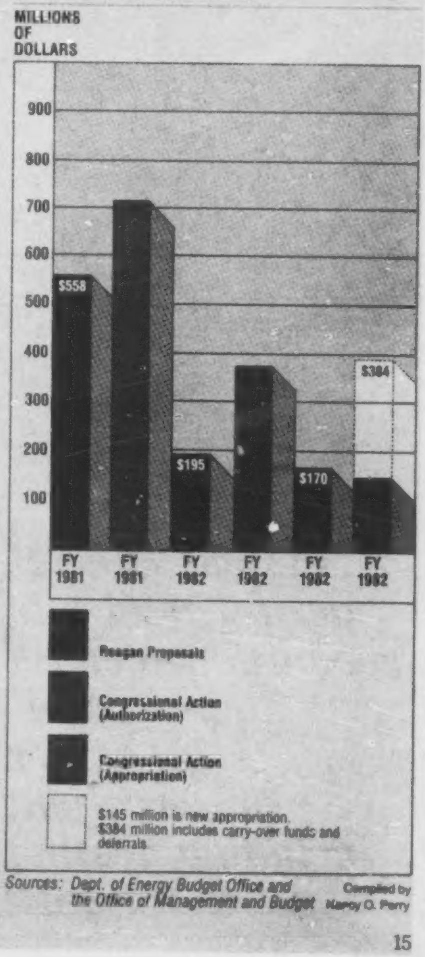
The Alliance supported some of the proposed changes which were designed to simplify procedures, but opposed those that would eliminate low-cost, effective measures or ignore the requirements of the statute. The Alliance outlined a legal mechanism to insure that RCS programs are administered at the state level in accordance with Congressional intent. In addition, the Alliance urged DOE to use RCS audits as a basis to rate homes so that their energy efficiency could be taken into account by mortgage lenders, home insurers, and others who provide financial services in the residential sector.

To supplement these policy papers and formal comments, meetings with Administration and Congressional leaders were held. ASE's Annual Meeting in March featured a discussion on federal energy and budgetary policy with David Stockman, Director of the Office of Management and Budget.

As the graph below shows, federal funding for energy conservation has been dramatically reduced and FY 1982 funding entailed an intense Administration/Congressional struggle. Administration proposals for FY 1983 (at $17 million) call for the virtual elimination of federal involvement in energy efficiency.

FEDERAL FUNDING OF DOE CONSERVATION PROGRAMS

ADMINISTRATION PROPOSALS— CONGRESSIONAL ACTIONS



Sources: *Dept. of Energy Budget Office and the Office of Management and Budget*

Compiled by Nancy O. Perry

PROBLEM:

Federally controlled natural gas prices which subsidize consumption and misallocate energy resources

ASE RESPONSE:

Advocate accelerated decontrol of natural gas with a "windfall profits" tax

After comprehensive analysis and extensive debate, the Alliance Board of Directors voted in late 1981 to support a policy resolution favoring the phased decontrol of prices on old and new natural gas over a three year period with the simultaneous adoption of an excise ("windfall profits") tax on old gas to be phased out in a reasonable period of time. The resolution called for rescinding present legislation controlling gas end use and specifically urged that a portion of the revenues from the windfall profits tax be directed to assist low income individuals in adjusting to higher gas costs. The Alliance has actively lobbied for this type of legislation in meetings with Administration officials, Members of Congress and public interest leaders.

Efforts to decontrol natural gas were begun in 1978 with the passage of the Natural Gas Policy Act (NGPA). Under NGPA, newly discovered gas (gas discovered after February 1977) is to be freed from price constraints by 1985 while old gas (about 40 percent of the total) is allowed to rise only at the same rate as inflation. Between 1978 and 1985, the increase in most gas prices is tied to the inflation rate, whether gas is new or old.

While clearly attempting to move towards full deregulation of natural gas, NGPA perpetuates some problems and causes others. For example, since "old" gas is never decontrolled under the NGPA, incorrect pricing signals will be received by consumers of natural gas. Similarly, the NGPA linked the price of gas to a predicted price of oil in 1985. However, since the prediction was so inaccurate, the possibility of a major "fly-up" in gas prices in 1985 now exists.

While higher prices are an inevitable result of decontrol, the Alliance believes the price mechanism is an essential method for sending the right signal to producers and residential, commercial and industrial consumers that we can no longer afford to waste energy. The Alliance firmly believes that equity concerns should be a major focus of our national energy policy and that hardships on low income households created by increased prices must be mitigated through government programs like the Department of Health and Human Services' Low Income Energy Assistance Program.

> ***"The price mechanism is an essential method of sending the right signal . . . that we can no longer afford to waste energy."***

PROBLEM:

Lack of understanding of the significance of energy efficiency

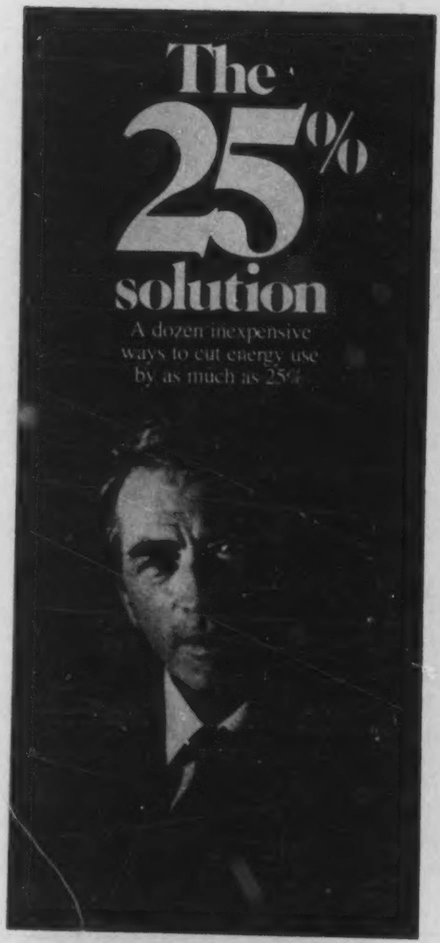
ASE RESPONSE:

A broad-based communications program directed at the general public and key policy officials

During this year, Gregory Peck continued as the Alliance's conservation spokesperson in the third of a series of radio, television, and print public service announcements under the auspices of The Advertising Council. Aimed at encouraging low-cost conservation measures in the home, the spot advertised a free brochure outlining a dozen inexpensive ways to save up to 25% of home energy costs. Based on the more than 30,000 individual requests received, "The 25% Solution" has been a highly successful publication.

The Alliance sponsored a symposium on International Cooperation in Energy Efficiency at the World Bank, attended by distinguished government officials, diplomats, industry, labor and public interest leaders. Hosted by Senator Charles H. Percy and World Bank President A. W. Clausen, the conference focused on the unique energy needs of developing nations. Bradford Morse, Administrator of the United Nations Development Program, Hollis Chenery, Vice President of Development Policy at the World Bank, and Trevor Byer, Senior Energy Specialist at the World Bank, participated in the panel discussion. The Secretary of State, Alexander M. Haig, Jr., gave the keynote address at a dinner following the conference. As a follow-up to the conference, a publication summarizing its policy implications was produced and published.

Conservation Energy!, the Alliance's monthly newsletter, analyzed and tracked major energy developments including the energy conservation budget, emergency preparedness and the possible dismantlement of the Department of Energy. Other communications and outreach efforts have included participation on PBS' acclaimed MacNeil-Lehrer Report and nationwide distribution of a full-color media kit, featuring tips on low cost/no cost conservation measures.


The 25% solution
A dozen inexpensive ways to cut energy use by as much as 25%

Robert Knudsen

Senator Charles H. Percy (l.) and Secretary of State Alexander M. Haig, Jr., at the September 16, 1981 symposium, "International Cooperation in Energy Efficiency."

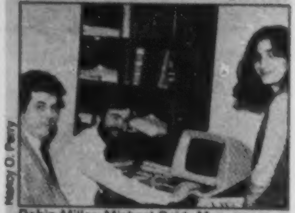
STAFF

Nancy O. Perry

James L. Wolf, Ellen Jo Fleming and Edward W. Lyle.

Nancy O. Perry

Douglas Norland and Steven Siegel.


Nancy O. Perry

Robin Miller, Michael Reid, Maryam Homayouni.

Nancy O. Perry

Barry Welch, Linda Schuck, Wayne Gathers, Lynn Collins and Genevieve Whittemore.

Michael Reid

Joyce Henderson, Nancy O. Perry, Ellen Morgenstern.

Nancy O. Perry

Sheila Hall and Susan Willis.

The Alliance staff, with credentials in most major disciplines, is responsible for developing and implementing the policy programs approved by the Board of Directors.

†Linda Parke Gallagher
Executive Director

Policy

James L. Wolf
General Counsel

Edward W. Lyle
Counsel

Douglas Norland
Economist

Armand Fitzpatrick
Project Engineer

*William McCumber
Project Engineer

Michael Reid
Senior Program Manager

Steven Siegel
Economist

Robin M. Miller
Research Associate

Ellen Jo Fleming
Secretary

Maryam Homayouni
Secretary

Conservation Programs

Lynn D. Collins
Director of Conservation Programs

Linda Schuck
Senior Program Manager

Wayne Gathers
Senior Program Manager

Barry Welch
Program Manager

Genevieve Whittemore
Secretary

Communications Development Administrative

Ellen Morgenstern
Director of Communications & Development

Nancy O. Perry
Communications and Development Associate

Susan Hayes Willis
Comptroller and Personnel Manager

Sheila Hall
Accountant

Joyce Henderson
Executive Assistant/Office Manager

Additional assistance was provided by consultants who contributed to specific projects; Robert Rauch, Marc Ross and Julia Stefanelli.

**loaned executive from IBM*

†loaned executive from AT&T

BOARD OF DIRECTORS

*†Honorable Charles H. Percy
Chairman

*Honorable Alan Cranston
Co-Chairman

*Honorable Carla A. Hills
Co-Chairwoman

*Honorable Daniel Parker
Co-Chairman

*†Marjorie Benton
U.S. United Nations Representative to UNICEF

Albert V. Casey
Chairman & Chief Executive Officer
American Airlines

A. W. Clausen
President
The World Bank

Marvin Davis
President
Davis Oil Company

John D. deButts
Former Chairman of the Board
American Telephone & Telegraph Co.

†Harry J. Gray
Chairman, President & Chief Executive Officer
United Technologies Corporation

*Robert K. Gray
President
Gray and Company

†Fred L. Hartley
Chairman and President
Union Oil Company of California

William A. Hewitt
Chairman & Chief Executive Officer
Deere & Company

Burton Joseph
President
I. S. Joseph Company

Lane Kirkland
President
AFL-CIO

†Charles F. Luce
Chairman of the Board
Consolidated Edison Company of New York

†Cornell Maier
Chairman of the Board
Kaiser Aluminum & Chemical Corporation

Roger P. Watts

ASE Board members (l. to r.), Fred L. Hartley, Charles H. Percy, Kenneth Rush, and Elvis J. Stahr at September 16, 1981 Board meeting.

Richard L. McGraw
Vice President Public Affairs
G. D. Searle & Company

Bess Myerson
Consumer Affairs Specialist
CBS

*Arthur C. Nielsen, Jr.
Chairman of the Board
A. C. Nielsen Company

Honorable David Packard
Chairman of the Board
Hewlett-Packard Company

††Peter G. Peterson
Chairman of the Board
Lehman Brothers Kuhn Loeb, Inc.

Honorable Russell Peterson
President
National Audubon Society

*Gene Pokorny
Vice President
Cambridge Reports, Inc.

Honorable Kenneth Rush

Honorable Robert C. Seamans, Jr.
Henry R. Luce Professor of Environment and Public Policy, Massachusetts Institute of Technology

Honorable Elvis J. Stahr
Senior Counselor
National Audubon Society

*Dr. Robert Stobaugh
Director Energy Project
Harvard Business School

*†O. Pendleton Thomas
Chairman of the Board
PenVest Inc.

*Honorable Russell Train
President
The World Wildlife Fund, U.S.

*Glenn E. Watts
President
Communications Workers of America

*Elmer Winter
Chairman, Corporate Advisory Board
Manpower, Inc.

**Executive Committee*
†Finance Committee
††Chairman Finance Committee

Honorifics

Walter F. Mondale
Honorary Chairman

Gerald R. Ford
Honorary Chairman

Thomas P. O'Neill, Jr.
Honorary Chairman

Robert H. Michel
Honorary Chairman

John R. Block
Honorary Co-Chairman for Agriculture

Malcolm Baldrige
Honorary Co-Chairman for Commerce

Caspar W. Weinberger
Honorary Co-Chairman for Defense

James B. Edwards
Honorary Co-Chairman for Energy

Samuel R. Pierce, Jr.
Honorary Co-Chairman for Housing & Urban Development

Alexander M. Haig, Jr.
Honorary Co-Chairman for International Policy

David A. Stockman
Honorary Co-Chairman for Management & Budget

BOARD OF ADVISORS

Robert O. Anderson
Chairman of the Board
Atlantic Richfield Company

Andrew A. Athens
National Chairman
United Hellenic American Congress

Carl E. Bagge
President
National Coal Association

Emmett Barker
President
Farm & Industrial Equipment Institute

William M. Batten
Chairman & CEO
The New York Stock Exchange

Cameron D. Beers
Director, Administrative & Special Services
The Gillette Company

William Bernbach
Chairman of the Executive Committee
Doyle Dane Bernbach, Inc.

Marver H. Bernstein
President
Brandeis University

Frank Borman
President
Eastern Airlines

Arnita Y. Boswell
University of Chicago

Cyril F. Brickfield
Executive Director
American Association of Retired Persons

David R. Brower
President
Friends of the Earth

Janet Welsh Brown
Executive Director
Environmental Defense Fund

Howard Bucknell, III
President
John Addison Cobb Associates

Charles J. Carey
President
National Food Processors Association

Edward W. Carter
Chairman of the Board
Carter Hawley Hale Stores, Inc.

Jack B. Chaddock
President
American Society of Heating, Refrigerating & Air-Conditioning Engineers, Inc.

Collis P. Chandler, Jr.
President
Chandler & Associates, Inc.

W. Montague Cobb
National Association for the Advancement of Colored People

George S. Cohan
President
Cohan & Paul, Inc.

Jacques-Yves Cousteau
The Cousteau Society

James B. Creal
Chairman, President
American Automobile Association

Robert B. Delano
President
American Farm Bureau Federation

William Dempsey
President & CEO
Association of American Railroads

Charles J. DiBona
President
American Petroleum Institute

Hugh Downs

Fred S. Dubin
P.E., President
Dubin-Bloome Associates, P.C.

Ruth Edelman

Charles F. Feledy
Director, Corporate Energy Programs
United Technologies Corporation

Stephen O. Frankfurt
President
Frankfurt Communications, Inc.

John W. Gardner
Chairman, Independent Sector

C. C. Garvin, Jr.
Chairman of the Board & CEO
Exxon Corporation

Robert A. Georgine
President, Building & Construction Trades Department
AFL-CIO

Peter N. Gillingham
President
Intermediate Technology/Local Resources

John J. Gunther
Executive Director
United States Conference of Mayors

Loyd Hackler
President
American Retail Federation

John D. Harper
Former Chairman
ALCOA

Robert A. Hefner, III
President & Managing Partner
The GHK Companies

Ruth J. Hinerfeld
President
League of Women Voters of the United States

Charles J. Hitch
President Emeritus
University of California

Ralph Hofstad
President
Land O'Lakes, Inc.

Jerome H. Holland
Chairman of the Board
American National Red Cross

Richard E. Holtzman
President
American Hotel & Motel Association

Jack K. Horton
Chairman of the Executive Committee
Southern California Edison Co.

Frederick G. Jaicks
Chairman
Inland Steel Company

Edward G. Jefferson
Chairman of the Board
E. I. du Pont de Nemours & Company

R. Clayton Jones, PHM
President
National Association of Housing & Redevelopment Officials

Walter M. Kardy
Executive Vice President
Mechanical Contractors Association of America, Inc.

I. L. Kenen
Editor Emeritus
Near East Report

John W. Kennedy
Chairman
York Division of Borg-Warner Corporation

Robert D. Kilpatrick
President & CEO
Connecticut General Corporation

David J. Kirker
President
Northern Community Investment Corporation

William Kolberg
President & CEO
National Alliance of Business

Peter G. Koltnow
President
Highway Users Federation

John R. Kupferer
Executive Vice President
National Association of Home Manufacturers

Myron Kuropas
Supreme Vice President
Ukrainian National Association

Julio S. Laguarta
President
National Association of Realtors

Jacqueline Lassiter
President
Jacqueline Lassiter Associates, Inc.

Louis F. Laun
President
American Paper Institute, Inc.

George H. Lawrence
President
American Gas Association

Warren Lebeck
Consultant
Chicago Board of Trade

Sol Linowitz
Coudert Brothers

R. William Taylor
President
American Society of Association Executives

Dan C. Lynch
President
National Association of Counties

Anthony J. Maggiore, Jr.
Associate Director
CR-SDC Community Action Program

Aloysius A. Mazewski
President
Polish-American Congress

William McCollam, Jr.
President
Edison Electric Institute

Willard McGuire
President
National Education Association

Dean McKay
Senior Vice President
IBM

Reverend A. J. McKnight
President
Southern Cooperative Development Fund, Inc.

David Olan Meeker, Jr. FAIA
Executive Vice President/CEO
The American Institute of Architects

Howard Morgens
Chairman Emeritus
The Procter & Gamble Company

Franklin D. Murphy
Chairman of the Executive Committee
Times Mirror Company

William O'Connell
Executive Vice President
United States League of Savings Associations

J. J. O'Donnell
President
Air Line Pilots Association

Eugene Odum
Director, Institute of Ecology
University of Georgia

Allan W. Ostar
President
American Association of State Colleges and Universities

Charles Parker
Executive Director
National Resource Center for Minority Contractors

Allen Paul
President
Agriculture Council of America

Robert B. Peabody
President
American Iron and Steel Institute

I. M. Pei
I. M. Pei & Partners

William G. Phillips
Chairman of the Board
International Multifoods

Alex Radin
Executive Director
American Public Power Association

William K. Reilly
President
The Conservation Foundation

Gilbert F. Richards
Chairman of the Board
The Budd Company

Bernard H. Ridder, Jr.
Chairman of the Board
Knight-Ridder Newspapers, Inc.

S. Dillon Ripley
Secretary
Smithsonian Institution

Laurance S. Rockefeller

George Romney

Ronald R. Rumbaugh
Executive Vice President
The Urban Land Institute

Rabbi Alexander M. Schindler
President
Union of American Hebrew Congregations

R. C. Schulze
President
Air-Conditioning & Refrigeration Institute

Norman R. Sherlock
Executive Vice President
American Bus Association

Kazys Sidlauskas
President
Lithuanian American Council

Virginia Smith
Vice President & Corporate Secretary
Intermountain Gas Company

Morton I. Sosland
President
Sosland Companies, Inc.

Robert W. Sullivan
Executive Vice President
National Oil Jobbers Council

John E. Swearingen
Chairman of the Board
Standard Oil Company (Indiana)

James W. Symington
Partner
Smathers, Symington & Herlong

Stan Taube
President
National Apartment Association

Thorwald N. Trolle
Vice President, Real Estate Division
Xerox Corporation

Winston R. Wallin
President
The Pillsbury Company

Carl Walske
President
Atomic Industrial Forum, Inc.

Barbara M. White
Consultant
Education & Public Affairs

Ronald S. Wishart
Director
Energy & Transportation Department
Union Carbide Corporation

Addie Wyatt
International Vice President
United Food & Commercial Workers International Union

Frank Zarb
Lazard, Freres & Company

Admiral Elmo R. Zumwalt, Jr.
President
Admiral Zumwalt & Associates, Inc.

FINANCIAL STATEMENTS

FINANCIAL SUPPORT

The Alliance's unrestricted support is derived from the generous contributions of corporations, unions, individuals and foundations. A contribution of $1,000 or more entitles corporations and unions to Membership status. Annual membership dues for individuals are $25, non-profit organizations $100, and small business firms $150. Members receive all publications of the Alliance including a monthly conservation newsletter.

Major Donors (Contributions of $10,000 or More)

American Telephone & Telegraph Company	$50,000*
Archer Daniels Midland Company	15,000
Atlantic Richfield Foundation	50,000
Chevron USA Inc.	25,000
Consolidated Edison Company of New York, Inc.	10,000
Conoco Inc.	10,000
Charles E. Culpeper Foundation, Inc.	25,000
Deere & Company	10,000
Exxon Corporation	55,000
International Business Machines Corporation	35,000*
Kaiser Aluminum & Chemical Corporation	15,000
Mobil Oil Corporation	10,000
Phillips Petroleum Company	25,000
Shell Companies Foundation Incorporated	35,000
Standard Oil Company (Indiana)	12,500
Sun Company	10,000
Texaco U.S.A.	15,000
Union Oil Company of California	27,500

Sustaining Members (More than $1,000/Less than $10,000)

The American Petrofina Foundation	$ 2,500
Armco Foundation	5,000
Ashland Oil, Inc.	5,000
BP North America Inc.	1,100
Caterpillar Tractor Company	7,500
Channel Home Centers	1,500
Cities Service Company	5,000
The Fluor Foundation	5,500
Ford Motor Company Fund	5,000
General Motors Foundation, Inc.	5,000
General Telephone & Electronics Foundation	5,000
Houston Natural Gas Foundation	5,000
International Multifoods	1,100
Lehman Brothers Kuhn Loeb Incorporated	2,000
MAPCO Inc.	1,250
Meenan Oil Company, Inc.	1,100
Natomas Company	5,000
Occidental Petroleum Corporation	5,000
Parker Foundation	2,000
RCA	1,500
Saxon Industries, Inc.	2,000
Tenneco Inc.	5,000
Union Carbide Corporation	7,500
Union Pacific Foundation	5,000
United Technologies Corporation	5,000
The Xerox Foundation	5,000

Contributing Members (Contributions of $1,000)

AFL-CIO
Air Products and Chemicals, Inc.
Allied Chemical Foundation
Allis-Chalmers Foundation, Inc.
Aminoil USA, Inc.
Castle & Cooke, Inc.
Chrysler Corporation Fund
Communications Workers of America**
E. I. du Pont de Nemours & Company Incorporated
The El Paso Company
Envirotech Corporation
Forest Oil Corporation
The Gillette Company
Gould Foundation
Kaiser Engineers, Inc.
Kerr-McGee Corporation
R. H. Macy & Company, Inc.
Monsanto Fund
Northwest Industries, Inc.
Owens-Corning Fiberglas Corporation
Panhandle Eastern Pipe Line Company
The Pillsbury Company
The Procter & Gamble Company
The Quaker Oats Foundation
Searle Pharmaceuticals Inc.
Sears, Roebuck and Company
St. Joe Petroleum Corporation
Tesoro Petroleum Corporation
Texas Eastern Corporation
The Times Mirror Company
United Association of Journeymen and Apprentices of the Plumbing and Pipe Fitting Industry
Wheelabrator-Frye Inc.

---

* + *Loaned Executive*

** *Additional contribution of subsidized rent*

Other Contributors

Alliance Oil & Refining Company
American Flange & Manufacturing Company, Inc.
Baker International
Bass Brothers Enterprises, Inc.
H. W. Bass & Sons, Inc.
Buttes Gas & Oil Company
Marjorie and Charles Benton
CF&I Steel Corporation
Chandler & Associates, Inc.
Colonial Pipeline Company
Columbia Gas System Service Corporation
Continental Emsco Company
Continental Resources Company
Cooper Energy Services
Core Laboratories, Inc.
Crystal Energy Corporation
Davy Inc.
Discovery Oil, Ltd.
Dresser Industries, Inc.
Enserch Corporation
Felmont Oil Corporation
Flanges, Inc.
Global Marine Inc.
Grace Petroleum Corporation
Michel T. Halbouty Energy Company
Halliburton Company
Jake L. Hamon
Estill S. Heyser, Jr.
Hughes Tool Company
Husky Oil Company
Jones Company
Kaiser Steel Corporation
Kinetics Technology International Corporation
Lebel Oil Corporation
Lloyd Corporation, Ltd.
The Lubrizol Corporation
The Lummus Company
Mesa Petroleum Company
Miller Brothers Oil Corporation
Mole Operating Company Inc.
Mosbacher Production Company
Gene Murrell
The NL Industries Foundation, Inc.
Northwest Exploration Company
Omega Marine
Daniel Parker
PPG Industries, Inc.
J. C. Penney Company, Inc.
Reading & Bates Petroleum Company
Reed Rock Bit Company
Republic Supply Company
Rexnord Inc.
Rock Island Refining Foundation
Rockwell International Corporation
Kenneth Rush
Santa Fe International Corporation
Robert and Eugenia Seamans
Self-Service Oil Company
Fred W. Shield Oil
Southern Natural Gas Company
Spur Drilling, Operating
Elvis and Dorothy Stahr
Steuart Petroleum Company
Robert and Beverly Stobaugh
Superior Supply Company
Texas Gas Exploration Corporation
O. Pendleton Thomas
Russell E. Train
Transco Companies Inc.
True Oil Company
TRW Reda Pump Division
Union Tank Car Company
Union Texas Petroleum
United Energy Resources, Inc.
Vaughey and Vaughey
Wilson Industries Inc.
Elmer and Nanette Winter
Witco Chemical Corporation
Zapata Corporation

*Restricted Grant Support**

Foundations	**Amount**	**Year of Award**
The Ford Foundation	$ 68,600.00	1981
The John A. Hartford Foundation	428,075.00	1980
The John D. & Catherine T. MacArthur Foundation	250,000.00	1980
The Rockefeller Family Fund	15,000.00	1981
Government		
Department of Energy	$ 50,000.00	1980
	590,000.00	1981

**Amounts shown are total amounts awarded. Revenue is recognized as expenses are incurred. Projects funded by 1980 awards were ongoing in 1981.*

Report and financial statements

Report
of Independent Accountants
To the
Board of Directors
Alliance to Save Energy

In our opinion, the accompanying balance sheet and the related statements of activity, functional expenses and of changes in financial position present fairly the financial position of the Alliance to Save Energy at December 31, 1981 and 1980, and the results of its operations and the changes in its financial position for the years then ended, in conformity with generally accepted accounting principles consistently applied. Our examinations of these statements were made in accordance with generally accepted auditing standards and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

Washington, D.C.
January 26, 1982

Price Waterhouse

Balance sheet

	December 31	
	1981	1980
Assets		
Current assets:		
Cash	$ 8,548	$ 33,156
Time deposits and certificates of deposit, including restricted amounts of $820,601 and $173,633	1,185,690	290,752
Other receivables	8,647	20,772
Government grant receivable		29,478
Prepaid expenses and other assets	13,861	1,755
	1,216,746	375,913
Furniture and equipment, at cost less accumulated depreciation of $9,723 and $6,070	44,621	10,567
Total	**$1,261,367**	**$386,480**
Liabilities and fund balance		
Current liabilities:		
Accounts payable and accrued expenses	$ 84,607	$ 68,585
Note payable to officer (Note 3)	15,000	15,000
Deferred grant revenue	820,601	203,111
Deferred dues revenue		1,726
	920,208	288,422
Contingency (Note 5)		
Fund balance—unrestricted	341,159	98,058
Total	**$1,261,367**	**$386,480**

Statement of activity

	Year ended December 31	
	1981	1980
Support and revenue:		
Unrestricted contributions and membership dues	$ 616,904	$553,088
Restricted contributions and grants:		
Government	195,133	29,478
Other	216,716	14,423
Donated services and facilities (Note 4)	171,916	116,449
Sales of publications and film rentals	2,860	48,884
Other, primarily investment income	68,239	9,267
Total support and revenue	**1,271,768**	**771,589**
Expenses:		
Programs (including $411,849 in 1981 and $43,901 in 1980 expended for restricted purposes)	839,169	501,214
General administration	147,110	109,082
Fundraising	42,388	53,977
Total expenses	**1,028,667**	**664,273**
Excess of support and revenue over expenses	243,101	107,316
Fund balance (deficit), beginning of year	98,058	(9,258)
Fund balance, end of year	**$ 341,159**	**$98,058**

Statement of functional expenses

Year ended December 31, 1981
(with comparative totals for 1980)

	1981				1980
	Programs	*General Administration*	*Fund Raising*	*Total Expenses*	*Total Expenses*
Salaries	$367,045	$ 79,615	$17,884	$464,544	$227,326
Payroll taxes and employees benefits	39,969	8,601	2,024	50,594	25,601
Total salaries and related expenses	407,014	88,216	19,908	515,138	252,927
Advertising Council campaign	18,006			18,006	108,694
Printing & publications	24,376	15,554		39,930	48,973
Professional fees and contract services	144,311	23,605	8,054	175,970	108,266
Occupancy	79,784	17,169	4,040	100,993	57,413
Supplies	14,606	3,143	740	18,489	3,932
Telephone and telegraph	14,779	3,180	748	18,707	8,504
Postage and shipping	13,945	3,001	706	17,652	19,268
Rental and maintenance of equipment	9,919	2,134	502	12,555	10,353
Library	6,492	1,397	329	8,218	1,368
Meetings, conferences and travel	67,127	4,414	6,191	77,732	23,795
Labor overhead	15,696	(15,696)			
Miscellaneous	20,228	372	1,024	21,624	18,688
Depreciation	2,886	621	146	3,653	2,092
Total expenses	**$839,169**	**$147,110**	**$42,388**	**$1,028,667**	**$664,273**

Statement of changes in financial position

	Year ended December 31	
	1981	**1980**
Financial resources were provided by (used for):		
Excess of support and revenue over expenses	$243,101	$107,316
Depreciation	3,653	2,092
	246,754	109,408
Purchase of furniture and equipment	(37,707)	(577)
Increase in working capital	**$209,047**	**$108,831**
Analysis of increase in working capital		
Cash and time deposits	$870,330	$221,667
Receivables	(41,603)	25,938
Prepaid expenses and other assets	12,106	
Accounts payable and accrued expenses	(16,022)	64,188
Deferred grant revenue	(617,490)	(203,111)
Deferred dues revenue	1,726	149
Increase in working capital	**$209,047**	**$108,831**

Notes to financial statements, December 31, 1981 and 1980

1. Organization

The Alliance to Save Energy was incorporated in 1977 to promote and encourage energy conservation through programs of public education, advocacy and information and to encourage the conduct of research into new methods of energy conservation. Support is derived from contributions and grants from corporations, labor, foundations and the federal government. The Alliance has been granted an exemption from federal income taxes under Section 501(c)(3) of the Internal Revenue Code. In addition, the Internal Revenue Service has ruled that the Alliance will be treated as a public foundation.

2. Summary of significant accounting policies

Contributions are considered to be available for unrestricted use unless specifically restricted by the donor. Donated services, materials and facilities, where significant in amount, are recorded at their fair value provided a measurable, objective basis exists for determining their value.

Grant revenue is recorded only to the extent that expenses are incurred; funds received in advance of grant performance are recorded as deferred grant revenue.

Depreciation of furniture and equipment is recorded using the straight-line method over a useful life of eight years.

Expenses are allocated to the organization's program, general administration and fundraising activities based on the time devoted by the staff to those activities or specific identification of charges where applicable.

3. Note payable to officer

The unsecured demand note payable to an officer was repaid in full on January 18, 1982. Interest on the note was contributed to the Alliance.

4. Donated services and facilities

The financial statements include the value of certain donated services that are necessary for administering the Alliance or represent services of individuals actively participating in the Alliance's program functions and for which an objective basis exists for determining their value. In addition, the rental value of the Alliance's leased office space is reflected as both support and expense even though it exceeds the amount charged.

The financial statements, however, do not include the value of various other contributed services and materials since the value of these items to the Alliance is not susceptible to objective measurement. For example, during 1981 and 1980 a public service organization and an advertising agency made contributions of time and facilities in connection with public information campaigns sponsored by the Alliance.

5. Contingency

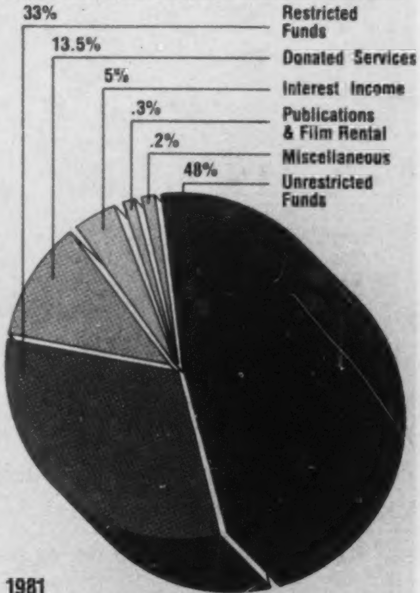
In connection with the preparation of the documentary film entitled "The Dynamics of Energy Efficiency," the Alliance received a statement in 1980 from a motion picture production company requesting payment of approximately $58,000 in addition to amounts previously paid. The Alliance believes that it is not legally obligated to pay this statement; however, the financial statements for 1981 and 1980 reflect a previously recorded liability of $20,000 relating to this matter. The outcome of this matter cannot be predicted at this time.

6. Grants

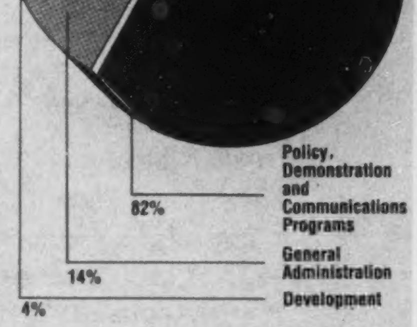
In late 1980 and during 1981, the Alliance was awarded the following restricted grants:

Funding organization	Amount	Description of grant
The John A. Hartford Foundation	$428,000	Analyzing the potential of energy conservation investment to reduce oil use in utility plants
John D. & Catherine T. MacArthur Foundation	$250,000	Examining possible industrial conservation incentives
U.S. Department of Energy	$640,000	Demonstrating methods of increasing private sector investment in energy efficiency at a local level
Rockefeller Family Fund	$15,000	Using legal processes to monitor the regulatory activities of federal departments and agencies concerning energy conservation
Ford Foundation	$68,600	Exploring effective means of achieving the delivery of conservation through low income energy assistance programs

1981
ALLIANCE TO SAVE ENERGY INCOME



1981
ALLIANCE TO SAVE ENERGY EXPENDITURES



ACKNOWLEDGEMENTS

While not directly compensated for their generous assistance, several individuals have significantly added to the Alliance's successful year and deserve special recognition. Their help has been a tremendous boost to us and we wish to publicly express our appreciation.

Douglas Bibby
J. Walter Thompson Company, USA
Carter Burgess
National Executive Service Corps
Susan Colantonio
The Advertising Council
Thomas Dickerson
Lehman Brothers Kuhn Loeb Incorporated
Murray Goodwin
J. Walter Thompson Company, USA
Lawrence Grabenstein
Financial Management Resources, Inc.
Collingwood Harris
The Advertising Council
Nadine Jacobsen
Office of Senator Charles H. Percy
Lowell Miller
Wilmer, Cutler and Pickering
William Strauss
Nancy Ginn
Subcommittee on Energy, Nuclear Proliferation and Government Processes of the Senate Governmental Affairs Committee

CREDITS

Editorial
Ellen Morgenstern
Lynn Collins
James L. Wolf
Linda Parke Gallagher
Nancy O. Perry

Design
Celia Strain

Senator **Weicker**. Thank you, Senator Percy. Thank you very much. I want to associate myself with your comments. Indeed you usually are a very patient man. You are also a very diplomatic man. You actually sounded like Lowell Weicker there testifying before the committee, and I must confess I think it is entirely warranted.

You are 100 percent right in what you have said before this committee.

Senator Hatfield.

STATEMENT OF HON. MARK O. HATFIELD, A U.S. SENATOR FROM THE STATE OF OREGON

Senator **Hatfield**. Mr. Chairman, I want to congratulate Senator Percy for a very forthright statement. I think it is time we have to lay aside the camouflage of political rhetoric and get to the heart of the matter.

I think the extreme irony and the ultimate dichotomy in this whole matter is that this administration is the third in a row to actually publicly state that it would be an option to intervene militarily in the Middle East even with the use of nuclear weapons to secure an oil supply, then on the other hand to do so little in terms of finding a more efficient way of using a sane rather than an insane policy.

To me for one, this represents an insane attitude toward this matter of using threatening military intervention, when the sane method would be to develop the genius of America in finding more efficient use of energy to make the other a moot issue and to eliminate it from our options. Now that is the supreme irony of this whole thing.

Now you have mentioned the matter of the authorizing effort of the Congress. Let me tell you, the appropriations effort has also been in line with that authorizing effort. In the current fiscal year the administration asked for $195 million. We have appropriated $384 million. We almost doubled the budget request, but the actual administration of this fund is to put it at the budget request level so that in effect we have a new method of impounding the congressional funds that have been appropriated for a program and to frustrate legislative intent.

I am asking that a whole review be made of this kind of action of de facto dismantlement against legislative intent, to see what the legality of this is. This is another loophole that we have to plug like we did with the Anti-Impoundment Act. Maybe this is a good lesson for the Congress to learn. No matter how clear the intent is, you can't trust administrations to carry out intent of Congress unless you nail them down to such an exact thing that you put them in a strait jacket. This is a clear violation of legislative intent vis-a-vis not only the authorization but the appropriations as well.

I would like to submit my whole statement for the record. Mr. Chairman, let me comment on one other thing. You have mentioned outside organizations. Let me add to your list of the criticisms of DOE. I think there is no department today that I receive more mail, critical mail, about the ineptitude, incompetence, the arrogance, the total refusal to face up to the challenge of conservation, than the Department of Energy. This will be indeed one of the historic marks of this administration in my view, which is their handling of energy, and that will be, it will be a minus mark. It will be a failure, utter failure.

In a report recently released from the General Accounting Office—we asked for a report—it stated that the DOE, and I quote, "* * * has failed to fulfill its administrative and enforcement responsibilities * * * and has overstated cost-saving expectations of newly revised RCS regulations." That is the GAO.

The report released earlier this month on the effect of the fiscal year 1983 budget energy authorization also concluded that, quote, "The U.S. Government is almost totally unprepared to deal with disruptions of oil imports." That is a very serious charge as well.

In summary, Mr. Chairman, the staff levels in energy conservation programs must be stabilized and in some instances increased to respond to the managerial deficiencies and ineptitude that are pointed out in these reports. As well as staff needs, the Department must be addressed to carry out the intent of Congress which is to maintain a balanced and healthy national emergency program.

These people have become undertakers. They are not administrators. They not only have put the coup d'etat in place, but they are now preparing for burial, and I think this is again one of those sad experiences of the relationship between the two branches of Government. One branch can't achieve the goals, but two branches working cooperatively can. I think when the Congress had made its position so clear beyond any shadow of a doubt, and then you have this kind of arrogance demonstrated by Mr. Tribble in his operation, the undertakers of energy conservation, that we have a right to demand a different performance, and I think your leadoff testimony lays an excellent foundation.

I can assure you that cooperation is a two-way street, and I feel that the administration needs our cooperation as well as we need their cooperation. I thought we were on the same team. I thought we had demonstrated to the voters in November that we told them we had the capacity to govern, and we certainly are not demonstrating that capacity in this kind of operation.

I think it is an utter national disgrace what they are doing to conservation in this country, and either it is through ignorance or it is through just outright defiance of congressional intent.

[The prepared statement and additional material submitted by Senator Hatfield follow. Testimony continues on p. 228.]

SENATOR MARK O. HATFIELD

OPENING STATEMENT

CONSERVATION AND SUPPLY SUBCOMMITTEE HEARING

TUESDAY, MARCH 30, 1982
9:00 A.M.
3110 DIRKSEN SOB

MR. CHAIRMAN, I THANK YOU FOR CALLING THIS HEARING TO REVIEW THE ADMINISTRATION'S FY83 BUDGET REQUEST FOR THE DEPARTMENT OF ENERGY CONSERVATION PROGRAMS.

I. AS YOU KNOW, MR. CHAIRMAN, I HAVE SPOKEN VIGOROUSLY AGAINST THE DEPARTMENT'S PROPOSED DISMANTLEMENT, PARTICULARLY AS IT IMPACTS ON "DEMAND" ORIENTED ENERGY PROGRAMS.

   A. IN MY MIND, THE ADMINISTRATION'S PROPOSAL TO TERMINATE THESE PROGRAMS AND AT THE SAME TIME THREATEN TO USE NUCLEAR WEAPONS IN DEFENSE OF MIDDLE-EAST OIL RESERVES IS A MAJOR POLICY FAILURE.

   B. WE AS A NATION WILL, IN EFFECT, HAVE FAILED TO CHANNEL OUR GENIUS TOWARD MORE SANE AND LOGICAL ALTERNATIVES SUCH AS INCREASED DOMESTIC ENERGY EFFICIENCY.

II. CENTRAL TO THE ISSUE OF DOE DISMANTLEMENT, MR. CHAIRMAN, IS THE QUESTION OF STAFF.

   A. AS YOU KNOW, CONGRESS LAST YEAR FOUND ENERGY CONSERVATION IMPORTANT ENOUGH TO DOUBLE THE PRESIDENT'S BUDGET REQUEST ($384 MILLION VS. $195 MILLION). AGAIN THIS YEAR CONGRESS IS LIKELY TO PROVIDE FUNDS FOR PROGRAMS DOE PROPOSES BE TERMINATED.

   B. DESPITE CONGRESSIONAL INTENT, HOWEVER, DOE IS USING THE PRESIDENT'S FY83 BUDGET REQUEST RATHER THAN ACTUAL APPROPRIATIONS AS ENACTED INTO LAW, AS THE BASIS FOR ESTABLISHING STAFFING LEVELS. IN SOME AREAS PERSONNEL HAS ALREADY FALLEN BELOW THE "CRITICAL MASS" NECESSARY TO CARRY-OUT EFFECTIVE MANAGEMENT AND PROGRAM DIRECTION. I UNDERSTAND THAT INTERNAL DOE DOCUMENTS AND OUTSIDE TESTIMONY WILL BE RECEIVED AT THIS MORNING'S HEARING

WHICH CONFIRM THIS REPORT.

C. MR. CHAIRMAN, I URGE THE SUBCOMMITTEE TO PAY CLOSE ATTENTION TO THE STAFFING ISSUE, LEST WE FACE A "DE FACTO DISMANTLEMENT" AT THE END OF THIS YEAR IN DIRECT VIOLATION OF CONGRESSIONAL INTENT.

III. A FINAL MATTER TO BRING TO THE COMMITTEE'S ATTENTION MR. CHIARMAN, IS THE GROWING SUPPORT FOR THESE PROGRAMS BY OUTSIDE RESEARCH GROUPS AND THEIR CONTINUED CRITICISM OVER CURRENT DOE ADMINISTRATION.

A. IN A REPORT RELEASED JUST YESTERDAY REGARDING THE RCS PROGRAM, THE GENERAL ACCOUNTING OFFICE STATES THAT: "DOE HAS FAILED TO FULFILL ITS ADMINISTRATIVE AND ENFORCEMENT RESPONSIBILITIES...AND HAS OVERSTATED COST-SAVING EXPECTATIONS OF NEWLY REVISED RCS REGULATIONS."

B. IN A REPORT RELEASED EARLIER THIS MONTH ON THE EFFECTS OF THE FY83 BUDGET AND ENERGY REORGANIZATION, THE GAO ALSO CONCLUDES THAT "THE U.S. GOVERNMENT IS ALMOST TOTALLY UNPREPARED TO DEAL WITH DISRUPTIONS IN OIL IMPORTS."

C. YET ANOTHER REPORT PUBLISHED JUST LAST WEEK BY A CONSORTIUM OF FOURTEEN SCIENTIFIC AND PUBLIC INTEREST GROUPS (ENTITLED THE REAGAN ENERGY PLAN -- A MAJOR POWER FAILURE) CRITICIZES THE ADMINISTRATION FOR "ABANDONING PROGRAMS FOR INCREASING EFFICIENCY... AND PROMOTING, INSTEAD, COMPETING ENERGY TECHNOLOGIES THAT ARE LESS RELIABLE AND MORE EXPENSIVE." (EG. NUCLEAR).

D. I BRING THESE FINDINGS TO THE COMMITTEE'S ATTENTION AND ASK THAT THEY BE INCLUDED IN THE HEARING RECORD. AS WELL, MR. CHAIRMAN, I HAVE PREPARED SEVERAL QUESTIONS OF DOE REGARDING THE STAFFING ISSUES AND THESE REPORTS. I ASK THAT THEY BE SUBMITTED FOR THE RECORD AS WELL.

IV. In summary Mr. Chairman, staff levels in energy conservation programs must be stabilized, and in some instances increased, to respond to managerial deficiencies that are pointed out by these reports. As well, staff-needs of the Department must be addressed to carry out the intent of the Congress, which is to maintain a balanced and healthy national energy program.

UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

ENERGY AND MINERALS
DIVISION

March 29, 1982

B-205365

The Honorable Lowell P. Weicker
Chairman, Subcommittee on Energy
Conservation and Supply
Committee on Energy and Natural
Resources
United States Senate

Dear Mr. Chairman:

Subject: The Residential Conservation Service: Issues Affecting The Program's Future (EMD-82-70)

In response to your December 15, 1981, request, we are providing the results of our examination of the Department of Energy's (DOE's) Residential Conservation Service (RCS) program. You specifically asked us to address

--whether DOE has adequately administered the program and enforced the requirements contained in the National Energy Conservation Policy Act (NECPA) and the Energy Security Act (ESA);

--the effect of recent budget and staffing reductions on RCS program activities;

--the current status and experience of State RCS programs; and

--the potential effects of key changes contained in DOE-proposed revisions to RCS program regulations, and whether the changes are consistent with congressional intent.

The RCS program requires large electric and gas utilities to provide various energy conservation services to their residential customers. As currently designed, the central feature of this program is an onsite inspection of a consumer's home by a qualified energy auditor. Based on energy conservation opportunities identified through the inspection, specific conservation information is then presented to the homeowner. The program also includes a number of ancillary services to assist consumers in implementing recommended measures.

More than 3 years after RCS was created, a wide diversity exists in the operational status of State programs and much uncertainty and confusion surrounds the program's future. DOE's inadequate program management, especially over the past year, has severely hampered progress in achieving the type of nationwide program envisioned by the Congress. Furthermore, DOE's revised program regulations, as proposed in November 1981, will probably not reduce program costs as expected by DOE, and could adversely affect the program's effectiveness. Although the proposed regulations are consistent with the statutes, two of the changes do not reflect the conferees' intent. Enclosure I discusses our objectives, scope, and methodology and provides details on the results of our work, which are briefly summarized below.

Our work has shown that DOE failed to fulfill its administrative and enforcement responsibilities under the RCS program. Specifically, DOE has failed to (1) review State plans and issue necessary regulations in a timely manner, (2) implement a monitoring system needed to determine program status and applicable use of its enforcement authority, and (3) enforce its Federal Standby Authority as required by statute. As a result, nearly half of the States either do not have an RCS program or are not implementing the program consistent with existing regulations or approved State plans.

Limited program budgets and inconsistent staffing support have hampered RCS program development and implementation. The Congress originally authorized $15 million to carry out the RCS program during fiscal years 1979-81. For fiscal years 1979 and 1980, DOE obligated about $5.6 million for RCS activities. In fiscal year 1981, the Congress appropriated $5.2 million, however, about $2.2 million was subsequently deferred. With respect to the fiscal year 1982 RCS budget, the previous administration's requested budget was $6.8 million. The current administration, however, revised that budget and requested no RCS funding. Although the House included no RCS funds in its version of DOE's fiscal year 1982 budget, the Senate approved $7 million in deferred funds for RCS. Following the House/Senate conference on the budget, about $3.4 million was made available for fiscal year 1982 RCS activities. We also found that despite increasing program responsibilities since the program began, staffing has been reduced from 22 to 8, including several reassignments exchanging experienced RCS personnel for non-experienced staff.

States with ongoing RCS programs have had widely differing program experiences. In addition, we question how the RCS program is affecting consumers. We found that (1) States, and utilities within States, experienced significantly different program participation rates; (2) program costs varied widely among utilities; (3) some utility programs appeared inconsistent with program regulations; (4) audit results in some areas were questionable; and (5) information on consumers' use of program arranging services was limited. Our findings suggest that utilities are exercising a large degree of flexibility in carrying out the RCS program. In some cases this flexibility has resulted in additional program services, while in other cases, it has resulted in RCS programs being implemented in a manner inconsistent with the regulations.

Proposed revisions to RCS program regulations will not likely generate expected cost savings, and may adversely affect the program. [1] According to DOE, by (1) applying a 7-year payback criterion to reduce the number of program measures included in the RCS audit, (2) eliminating post-installation inspection requirements, and (3) reducing program announcement requirements, 50 percent of the program's cost could be reduced.

Our work indicates that DOE's cost-saving expectations are overstated, even if adopted by the States. Moreover, to the extent States adopt DOE proposals to (1) alter requirements for audit comprehensiveness, (2) eliminate in-person, onsite presentation of audit results, and (3) eliminate post-installation inspections, they could decrease the quality of the RCS audit and thus reduce the program's effectiveness.

Although the proposed regulations are consistent with the statutes, proposed changes concerning the (1) prohibition on who may prepare the list of approved suppliers, contractors, and lenders, and (2) requirements for post-installation inspection are inconsistent with the conferees' intent.

CONCLUSIONS

Overall, we are concerned about the RCS program's current status. Most of the problems we found could be substantially resolved by appropriate DOE actions. However, over the past year, DOE has exhibited an unwillingness to carry out the program, expressing its view that there is no longer a need for the Federal Government to require the RCS program. We believe this unwillingness has been a major influence on the decisions of 19 States--and particularly 9 States with approved plans--not to implement the RCS program at all.

An overall Federal position on the RCS program has not been made clear. We recognize that DOE's position on RCS is consistent with administration efforts to reduce the cost and burden of Federal regulations. The administration's fiscal year 1983 budget provides no funds for further RCS program implementation or enforcement. With respect to congressional actions, no new funds were appropriated for RCS in fiscal year 1982. On the other hand, the Senate overwhelmingly rejected a proposal to prohibit all RCS funding fiscal year 1982. Subsequently, Congress made about $3.4 million available from deferred fiscal year 1981 funds for fiscal year 1982 program activities.

---

[1] DOE's proposed revisions generally limit the program only to requirements contained in the statutes.

The RCS program is at a crossroad. Budget and legislative decisions now before the Congress will determine whether the program will continue to exist, and if continued, the types of consumer services to be provided by utilities under the program. However, if the Congress decides to continue the program in its current form and DOE persists in its reluctance to implement it, States are likely to continue abandoning RCS or exercising a great degree of flexibility in carrying out the program. In either case, congressional expectations for the program are not likely to be met.

- - - -

As requested by your office, we did not obtain official agency comments on the matters discussed in this report. We are also sending this report today to the Chairman, Subcommittee on Energy Conservation and Power, House Committee on Energy and Commerce. As arranged with your office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days from the date of the report. At that time we will send copies to interested parties and make copies available to others upon request.

Sincerely yours,

J. Dexter Peach
Director

Contents

Page

INTRODUCTION 6
  Prior GAO report on residential energy conservation 7
  Objectives, scope, and methodology 7

DOE'S ADMINISTRATIVE AND ENFORCEMENT RESPONSIBILITIES HAVE NOT BEEN CARRIED OUT 8
  Delays in program implementation 9
  Necessary program monitoring and evaluation not conducted 10
  Program enforcement responsibilities ignored 10

BUDGET AND STAFFING REDUCTIONS HAMPER RCS PROGRAM MANAGEMENT AND ADMINISTRATION 11

STATE RCS PROGRAM EXPERIENCES VARY 13
  Program participation rates differ by State and utility 13
  Program costs vary by utility 14
  Some programs appear inconsistent with DOE regulations 15
  Questionable audit results provided to consumers 15
  Extent of program-arranging and post-installation inspection services unknown 17

PROPOSED RCS REGULATIONS UNLIKELY TO ACHIEVE EXPECTED RESULTS 17
  Expected cost savings are questionable 18
  Program effectiveness likely to be reduced for States adopting changes 19
  Two proposed regulations contain less specific requirements than intended 22

SUMMARY AND CONCLUSIONS 23

ABBREVIATIONS

DOE	Department of Energy
ESA	Energy Security Act of 1980
FTC	Federal Trade Commission
GAO	General Accounting Office
NECPA	National Energy Conservation Policy Act of 1978
OMB	Office of Management and Budget
RCS	Residential Conservation Service

THE RESIDENTIAL CONSERVATION SERVICE: ISSUES AFFECTING THE PROGRAM'S FUTURE

INTRODUCTION

The National Energy Conservation Policy Act of 1978 (NECPA), as amended by the Energy Security Act of 1980 (ESA) requires large electric and gas utilities, 1/ through the Residential Conservation Service (RCS) program, to provide various energy conservation services to their residential consumers. As currently designed, the central feature of this program is an onsite inspection of a consumer's home by a qualified energy auditor. Based on energy conservation opportunities identified through the inspection, specific energy conservation measures and related information are presented to the homeowner, including contractor and/or do-it-yourself installation costs, expected energy savings, and anticipated payback periods for each measure. The program also provides ancillary consumer services. These services include (1) identifying State-approved installers, suppliers, and lenders which can assist consumers in undertaking suggested conservation measures, (2) arranging for the installation or financing of suggested conservation measures, (3) inspecting completed conservation measures in certain instances, and (4) providing conciliation services for consumer complaints. The program allows a $15 maximum direct customer charge for the audit with remaining program costs generally treated as a utility's cost of providing service.

During the past year, the future of the RCS program has been in doubt. In early 1981, DOE indicated its intention not to request funding for the program. The uncertain future of RCS heightened in March 1981 with the administration's identification of RCS, through the Presidential Task Force on Regulatory Relief, as a burdensome and costly Federal program. In April 1981, a Senate bill to repeal RCS legislation was introduced, followed by a similar House bill in July 1981. Following these unsuccessful legislative attempts to repeal RCS statutes, the administration, in October, supported an amendment to the Department of the Interior and related agencies 1982 appropriations bill to prohibit expenditure of fiscal year 1982 funds on RCS. The Senate overwhelmingly rejected such a funding restriction. These events, however, raised serious concerns about the program's future.

In November 1981, DOE proposed a major revision to the RCS program regulations based on its belief that the Federal Government no longer needed to mandate the provision of services required by the RCS program. These proposed rules significantly

---

1/Utilities with annual sales exceeding 10 billion cubic feet of natural gas or 750 million kilowatt-hours of electricity.

relaxed or eliminated many existing program requirements and set forth DOE's intention to provide no funding for further program implementation or enforcement. Moreover, DOE invited the States to submit changes to their existing programs prior to public hearings and rule finalization.

Prior GAO report on residential energy conservation

Last year we reported on DOE's residential energy conservation outreach activities. 1/ We identified the RCS program as having potentially significant benefits as a residential energy conservation outreach program because of its comprehensive personalized energy audit. Specifically, we pointed out that if consumers do not have comprehensive information, and are not effectively provided such information, the extent to which they can or will realize available energy conservation opportunities will be limited. Moreover, combining individualized information with personalized delivery of that information has been shown to result in the greatest amount of voluntary energy conservation by each individual. We concluded that DOE could contribute to achieving greater voluntary residential energy conservation by assuring that consumers effectively receive such comprehensive information.

Objectives, scope, and methodology

The objective of our review was to respond to four issues relevant to DOE's implementation of the RCS program as specified in the December 15, 1981, letter request from the Chairman, Subcommittee on Energy Conservation and Supply, Senate Committee on Energy and Natural Resources, and the Chairman, Subcommittee on Energy Conservation and Power, House Committee on Energy and Commerce.

To meet our objective, we (1) interviewed DOE, State, and utility officials responsible for developing, planning, and implementing the RCS program; (2) discussed with Office of Management and Budget (OMB) and Federal Trade Commission (FTC) representatives their involvement in the RCS program; (3) analyzed legislation and existing and proposed program regulations; (4) examined program documents from DOE, States, and utilities; and (5) observed the performance of an RCS audit in each of two States.

Not included in the scope of our work were issues regarding unfair and deceptive practices or other consumer protection issues. These issues were not addressed because FTC has performed extensive work in this area as required by Section 225 of NECPA and is currently reporting its findings to the Congress.

1/"Residential Energy Conservation Outreach Activities--A New Federal Approach Needed" (EMD-81-8, Feb. 11, 1981).

In order to determine program status and experience, we contacted a number of States and visited selected States. Specifically, we interviewed by telephone 46 State RCS program officials (including the District of Columbia and Puerto Rico) to collect basic information on each State's program status and results and each State's likely response to different elements of DOE's proposed regulations. To obtain a more detailed understanding of RCS program operations, we visited California, Nevada, Iowa, Minnesota, Massachusetts, and Connecticut. We selected these States because, in our judgment, they represented a cross-section of RCS programs nationwide. Of the six States we visited, all had approved RCS plans, and all but Nevada had implemented their programs. Of the five States with ongoing programs, all had performed a large number of RCS audits, four States (California, Connecticut, Massachusetts, and Minnesota) had either some type of supporting legislation or other incentives to encourage residential conservation, and two States (Massachusetts and Connecticut) had utilities which joined together to form a separate organization to carry out their program responsibilities.

Time and data limitations did not allow us to independently verify the data obtained from both the telephone survey and the States visited. However, much of the data obtained was consistent among the States and utilities we visited, and generally confirmed the information received from the telephone survey. Therefore, we were reasonably confident in drawing some generalized conclusions about the nationwide RCS program.

To determine the potential effects of DOE's proposed program regulations, we selected several key proposed changes that affected either program costs or effectiveness. This selection was based on statements made by DOE and our own judgment.

Our work was performed in conformance with GAO's current "Standards for Audit of Governmental Organizations, Programs, Activities, and Functions."

DOE'S ADMINISTRATIVE AND ENFORCEMENT RESPONSIBILITIES HAVE NOT BEEN CARRIED OUT

DOE has failed to fulfill its administrative and enforcement responsibilities under the RCS program. While DOE is responsible for ensuring that the program is implemented consistent with the procedures and schedules specified in the statutes and program regulations, it failed to (1) review State plans and issue amending regulations in a timely manner, (2) implement a monitoring system needed to determine program status and applicable use of its enforcement authority, and (3) enforce its Federal Standby Authority as required by statute. These actions have caused serious program delays and, in our opinion, contributed to the uncertainty and confusion surrounding the program's future.

Delays in program implementation

The RCS program has not been implemented according to schedule. Slow development and approval of State plans and DOE's failure to promulgate new regulations to implement the ESA amendments to NECPA have delayed the program's progress. With only one year remaining before the initial program announcement and audit offer requirements were to be completed, the program is far from being fully implemented nationwide.

Final RCS program regulations were promulgated in November 1979 and effective one month later. Under NECPA, to avoid enforcement action, States were to submit a proposed plan to DOE within six months or by June 1980 and, unless granted an extension, were to have plans approved by DOE within three months or by September 1980. Following plan approval, utilities had 6 months to implement the program by initially providing eligible consumers with a program announcement. Within 2 years after the announcement, all utilities were to have offered program audits and related services to consumers.

Required target dates for plan approval were not met because (1) the complexity of the program regulations and State plans required DOE to take more time than originally envisioned for review and (2) staffing shortages hampered the review process. (See pp. 11 to 13.) Although the first State plan was approved one month beyond the September deadline, only nine States received plan approval by the end of 1980. The plan approval process continued during the following year, with the most recent approval occurring in September 1981. Two States which submitted plans in 1980 have not yet received DOE's approval; three other plans are awaiting approval pending State responses to DOE inquiries. In total, 41 of 51 eligible States 1/ have received plan approval.

Delays in approving plans have, in turn, prevented most States from meeting the March 1981 target date for issuing program announcements. Moreover, our telephone survey of State program officials indicated that at least one participating utility in 23 States had not issued such announcements within the 6-month deadline after plan approval.

Finally, DOE's failure to issue program regulations within the required time has delayed meeting the target date for the RCS program's expansion. In June 1980, ESA amendments provided among other things, that the RCS program expand its definition of eligible buildings to consumers living in multi-family dwelling units of five or more which are not centrally heated or cooled.

1/Includes the District of Columbia and Puerto Rico and excludes Nebraska which does not have a State plan because its utilities do not meet minimum sales requirements. (See p. 6.)

Regulations to incorporate ESA program revisions were to have been issued by the end of October 1980, with changes to be implemented by January 1982. Although DOE issued proposed regulations in January 1981 incorporating ESA provisions, they were later withdrawn by the new administration and reproposed in November 1981. However, one month later, DOE sent a letter to State program managers stating that participants would not be required to implement such an expansion until final regulations were issued. These final regulations have still not been issued.

Necessary program monitoring and evaluation not conducted

DOE's limited program monitoring and evaluation efforts have not provided the type or amount of information necessary to assess how efficiently and effectively the program has been implemented. Furthermore, the lack of appropriate information impeded DOE's ability to carry out required enforcement actions.

Although DOE has stated its belief that the RCS program is no longer needed, it continues to have administrative and enforcement responsibilities under NECPA, ESA, and existing regulations. To date, DOE's program monitoring and evaluation efforts have been limited to an annual report on program status based on reports submitted by the States, and case studies of RCS programs in selected States performed by two contractors. These activities have been of minimal value. For example, while the regulations require States to annually submit to DOE specific program information, only about half the States responded. Moreover, according to DOE, the information provided varied widely in quantity and quality, and DOE was unable to draw meaningful conclusions about program operations.

DOE has not adequately fulfilled its program monitoring and evaluation responsibilities to ensure that the RCS program is implemented efficiently and effectively and in compliance with the regulations. Moreover, DOE officials stated that the monitoring necessary to support required program enforcement has not been performed and is not currently planned as part of any future RCS activities.

Program enforcement responsibilities ignored

NECPA generally requires DOE to exercise its Federal Standby Authority when a State does not have, or is not adequately implementing, an approved RCS State plan. Although DOE officials acknowledge several cases where such authority could be used, DOE has failed to take enforcement actions. DOE's refusal to exercise its authority is apparently being viewed by some States as support for deviating from existing program regulations including, in some cases, refusing to implement an approved plan at all. Our review indicates that DOE's Federal Standby Authority may be applicable in nearly half of the States.

According to NECPA, the Secretary of DOE must exercise Federal Standby Authority when

(1) a State does not have an approved plan within 270 days after final rules are issued or within an extension period granted by the Secretary on request of the State or utility for good cause, or

(2) the Secretary determines after notice and opportunity for a public hearing that an approved plan is not being adequately implemented in a State.

If either condition is met, DOE is required to order utility compliance with a DOE developed RCS plan. As a precondition to using its enforcement authority, DOE developed and published for public comment a proposed standby plan in January 1981. However, events over the next several months (see pp. 6 and 7) precluded the plan's finalization, and in November 1981 the proposed plan was officially withdrawn. During this period, DOE officials acknowledged that four States which did not submit plans and an undetermined number of other States not adequately implementing approved plans were subject to enforcement actions under its Standby Authority. However, according to DOE officials, even if the plan had been approved no enforcement action would have been taken because (1) program regulations were being revised and (2) no program funds were requested for fiscal year 1982.

Our work has shown that DOE's Federal Standby Authority may be applicable in nearly half of the States. Specifically, we found 19 States have not implemented an RCS program including

--9 States with approved plans,

--3 States not submitting plans,

--2 States with disapproved plans, and

--5 States with pending plans.

In addition, at least four other States may not have implemented the RCS program according to existing regulations or approved State plans. We believe DOE's failure to enforce its standby authority and not request funds for such activities during fiscal year 1982 is viewed by some States as further support of DOE's intention to discontinue the program and its approval for States to act similarly.

BUDGET AND STAFFING REDUCTIONS HAMPER RCS PROGRAM MANAGEMENT AND ADMINISTRATION

The RCS program has been hampered by a limited budget and inadequate staffing. These problems have contributed to DOE's failure to carry out key program administrative and enforcement activities and, in our view, have severely impacted on the progress of the RCS in achieving nationwide status.

The Congress originally authorized $15 million to carry out the RCS program during fiscal years 1979-81. For fiscal years 1979 and 1980, DOE obligated about $5.6 million for RCS activities. In fiscal year 1981, the Congress appropriated $5.2 million, however, about $2.2 million was subsequently deferred. The current administration requested no RCS funding for fiscal year 1982. Although the House included no RCS funds in its version of DOE's fiscal year 1982 budget, the Senate approved $7 million in deferred funds for RCS. Following the House/Senate conference on the budget, about $3.4 million was made available for fiscal year 1982 RCS activities. This funding level is significantly below the previous administration's fiscal year 1982 budget request of $6.8 million, which was to allow for implementation of key program activities. The administration has not requested any RCS program funding for fiscal year 1983.

The number of staff committed to the RCS program as well as staff changes and reorganizations have been significant problems since the program began. During the rulemaking process in 1979, RCS personnel consisted of 22 professional staff (including 3 full-time and 6 part-time RCS staff and 13 non-RCS support staff). By 1980, the RCS program had numerous additional responsibilities such as: reviewing and approving State and nonregulated utility RCS plans, acting on over 100 requests for exemptions from different provisions in the regulations, providing technical assistance, and incorporating in program regulations the requirements of the ESA amendments to the RCS program.

To meet its responsibilities, RCS program officials made three requests for more staff. In late 1979, 10 regional staff positions were requested to allow adequate program monitoring and enforcement. The request was approved at the Assistant Secretary level and was a part of an overall request for additional personnel submitted to OMB. Although OMB approved part of the total personnel request, the staff positions for RCS program activities were never filled.

In the summer of 1980, a second request was made for early hiring of staff for recently approved positions as well as for filling previously existing vacancies. This request resulted in hiring two people for the RCS program. By this time, the staffing level for 1980 had been reduced to 16 professionals. The third request was made several months later--again for 10 regional staff--and was not approved within DOE.

By August 1981, aside from an acting division director and an acting branch chief, both of whom were detailed from other programs, the RCS staff had been reduced to six, of which only one was full time. Additional staff changes occurred during the remainder of 1981, including the loss of 5 staff from a reduction-in-force and several staff reassignments that exchanged experienced RCS staff for non-experienced staff. As of February 1982, RCS personnel consisted of eight professional staff. According to a DOE official, 15 to 20 full-time staff supported by contractors are needed to fulfill RCS program responsibilities.

We believe that limited staff and DOE's failure to use the funds it had available for RCS program activities have severely impacted on the progress of the RCS program in achieving nationwide status. In addition to staffing and budgetary difficulties, three major reorganizations and at least three physical moves of the RCS office since 1979 contributed to a disruption in RCS activities.

STATE RCS PROGRAM EXPERIENCES VARY

States with ongoing RCS programs have had widely diverse program experiences. In addition, we question how the program is affecting consumers. We found significantly different consumer participation rates among States and utilities within States; varying utility RCS program costs; some utility programs which appear to be inconsistent with program regulations; questionable audit results in some locations; and limited knowledge about the use being made of program-arranging services, and subsequently, compliance with post-installation inspection requirements. These findings suggest that States and/or utilities are exercising a large degree of flexibility in carrying out the RCS program. In some cases this flexibility has resulted in enhanced program services, while in other cases, it has resulted in RCS programs being implemented in a manner inconsistent with the regulations.

Program participation rates differ by State and utility

Consumer participation in the RCS program has varied widely among States and individual utilities. While these experiences cannot be fully explained, a number of factors are probably affecting participation rates.

Original DOE expectations for program participation averaged 7 percent per year if the audit was free of charge and 1.5 percent per year if the audit charge was $15. A comparison of consumer participation in 6 States which do not charge for the audit and 18 States which have established charges for the audit (either $5, $10, or $15) disclosed overall participation rates of 3.5 percent and 2.2 percent, respectively.

With respect to individual States, program participation rates ranged from 0.1 percent to 6.9 percent. We also found significantly different participation rates for individual utility programs within States. For example, we found that program participation levels for Minnesota utilities varied from 0.7 percent to 5 percent. In Iowa, participation rates for utilities varied from 0.6 percent to 2.6 percent.

A number of factors could be affecting consumer participation rates. Prior utility experience in residential energy audit programs may be resulting in better marketing of RCS program services and, subsequently, higher consumer participation. The two California utilities we visited had prior experience in audit programs and were experiencing participation rates of over 5 percent. One of these utilities also offered zero interest loans for consumers who wished to implement audit recommendations. Such additional program services are also likely to have a positive effect on program participation rates.

We also found that State laws may affect program participation rates. In Minnesota, State law requires homeowners to obtain an energy evaluation prior to selling their home. Since Minnesota's RCS program energy audit meets the State law audit requirements, individuals who consider selling their homes have an increased incentive to request an RCS audit. Minnesota's program participation rate as of December 31, 1981, was about 2.8 percent.

Finally, the cost of the audit to the consumer may be affecting participation. As discussed above, States where the audit is provided free to consumers are generally experiencing higher participation rates than States where consumers are charged for the audits.

Program costs vary by utility

Utility costs incurred in carrying out the RCS program varied widely, both in total and on a cost-per-audit basis. While costs per audit in some cases appeared unreasonably high, such costs were expected to decrease as the number of audits performed increased.

Most of the utilities we contacted provided us data on their RCS program costs. Based on these data, utilities were experiencing overall RCS program costs ranging from less than $100,000 to about $10 million. With respect to RCS programs in Connecticut and Massachusetts, 1981 RCS program budgets indicated total statewide costs of over $4 million and $7 million, respectively.

Cost per audit also varied in locations we visited. Based on either projected or actual 1981 program costs from six locations, costs per audit ranged from $106 to about $1,000 and averaged around $170. The higher cost per audit figures generally reflected situations where high program startup costs were being allocated to a small number of audits completed. In three cases where utilities were contracting with private firms to conduct the audits, contractors were charging about $63 per audit.

RCS program costs to utilities result from a number of activities. Program costs include expenditures for such items as auditors' salaries, equipment for audits, audit processing, auditor training, program marketing, program administration, and recordkeeping. These variations in costs result from different individual utility costs in these program areas.

Some programs appear inconsistent with DOE regulations

We noted instances where ongoing programs appear to be inconsistent with RCS program regulations. These situations raise questions about the extent that programs underway nationwide are complying with the program regulations.

RCS program regulations require that utilities provide, on request, assistance to help the consumer implement recommended energy conservation measures. The assistance includes arranging for installers, suppliers, and lenders who will finance measures. We found that the RCS program in Massachusetts does not require utilities to provide, and utilities are not providing, such services. State program officials told us they were aware that this aspect of their program is inconsistent with DOE program regulations.

Aspects of individual utility programs in Iowa and California also did not appear to be fully consistent with program regulations. In one case, a utility auditor told us that he did not always include all required program measures in his audits. The auditor explained that past audit results for certain program measures had disclosed very long payback periods and, unless a consumer specifically requested information on these measures, he did not include them in the audit. In the other case, arranging services of one utility were limited to providing the consumer lists of suppliers, installers, and financial institutions which would assist the consumer in carrying out conservation measures recommended from the audit. This action does not appear to fully comply with the RCS program requirement that utilities offer to assist the consumer in obtaining suppliers, installers, and financial assistance.

Questionable audit results provided to consumers

Questionable data are resulting from audits in different locations. These data are routinely being provided to consumers in the form of audit results. We are concerned about the validity of this information.

We compared average payback periods for many program measures from completed audits in Iowa, California, and Massachusetts. The data resulted from experiences of two utilities in Iowa, one utility in California, and from statewide information in

Massachusetts. Our comparison disclosed that significant differences in average payback periods resulted from these audits as illustrated in table 1.

Table 1

Average Payback Periods
for Selected Conservation Measures

Measure	Iowa utility	Iowa utility	Massachusetts statewide	California utility
	(years)			
Ceiling insulation	16.5	20.5	6.9	9.8
Storm or thermal doors	32.0	34.3	5.7	13.5
Electric ignition system	20.7	21.0	10.7	6.0
Replacement furnace	13.3	17.3	24.4	9.8
Glass shading	49.2	26.1	15.6	16.1
Water heater insulation wrap	2.2	8.9	2.0	0.8
Solar pool heating	28.1	36.2	14.7	12.4
Passive solar-direct	51.4	57.5	12.3	14.2

Although payback periods may differ because of such factors as weather, energy costs, and material and installation costs, the range of values we found appear unreasonable. For example, as shown above, payback periods for ceiling insulation range from 6.9 years to 20.5, years while payback periods for water heater insulation wrap ranged from 0.8 years to 8.9 years. While the differences in average payback periods for ceiling insulation could, in our view, be explained if the energy efficiency of the existing housing stock in these two areas is substantially different, we cannot reasonably explain the wide variance in water heater insulation average paybacks.

We are concerned that the wide disparity in audit results raises questions about the validity of information being provided to consumers. With respect to the data from the two Iowa utilities, of 24 energy conservation measures we reviewed, average payback periods for 11 measures varied by more than 25 percent. In one case, the average payback varied by over 300 percent. Such differences appear unreasonable. While the average payback period disparity for some measures may be reasonably explained, the disparity in payback periods for others may be resulting from other causes such as inappropriate calculations methodologies or questionable raw data being used for payback calculations.

Extent of program-arranging and post-installation inspection services unknown

Few States have information on the number of consumer requests for program-arranging services. Without such information, it is impossible for a State to determine when post-installation inspections are required to be performed.

RCS program requirements for post-installation inspections are closely related to instances where consumers request a utility's help in implementing recommended energy conservation measures. When utilities provide such assistance to consumers, they become responsible for conducting post-installation inspections under certain conditions. However, because many States do not know how often utilities have assisted customers in arranging services, there is no basis for determining whether utilities are fulfilling post-installation inspection requirements.

Based on our survey of 32 States which have programs underway, 15 could not provide us information on the number of times consumers requested program-arranging services. Of the remaining 17 States, 11 reported that no consumers requested program arranging services and one had not conducted any audits as of December 31, 1981.

Overall, few post-installation inspections are being performed. Based on responses from 27 States where information was available, 14,724 such inspections have been performed. However, about 90 percent of those inspections were performed in California, and one utility accounted for over 90 percent of these. A total of 17 States reported that no inspections had been performed.

Given the limited amount of information on consumers' use of arranging services, we cannot determine the extent that post-installation inspection requirements are being met. Moreover, we are concerned that nearly half of the States could not provide us information on the use of arranging services by consumers. Such information should be an essential part of program monitoring, particularly because of its relationship to post-installation inspections, and furthermore, it is required to be provided to DOE under program regulations.

PROPOSED RCS REGULATIONS UNLIKELY TO ACHIEVE EXPECTED RESULTS

Two years after final program regulations were issued, DOE proposed revised RCS regulations which eliminated existing regulatory requirements not explicitly included in the statutes and reduced and relaxed existing rules to meet minimum statutory requirements. According to DOE, if these changes were adopted by the States, 50 percent of the program costs would be saved. In our view, the proposed regulations are unlikely to achieve the cost savings DOE expected. Moreover, to the extent the proposed rules are adopted, program effectiveness could be adversely affected. Finally, two proposed regulations, while consistent with the statutes, are inconsistent with intent expressed by the conferees in the Conference Committee reports.

Expected costs savings are questionable

DOE believes that the proposed revisions to the RCS program, if adopted, would result in a 50-percent cost savings over the life of the program. DOE officials stated that the principal cost reductions would result from eliminating items from the audit, eliminating post-installation inspections, and reducing program announcement requirements. Based on our analysis, major cost savings from these changes are unlikely to be achieved.

DOE proposes to exclude all program measures currently included in an RCS audit that do not result in a payback period of 7 years or less. DOE expects that by limiting the number of audit items required, audit costs would be reduced. This 7-year payback criterion appears to represent the predominant cost-savings element of the three items identified by DOE. 1/ We found that major cost savings from this proposed change are questionable and that DOE's application of the 7-year payback criterion may eliminate some measures from an RCS audit which should be included.

Although data to assess likely cost savings resulting from the 7-year payback criterion are limited, California officials estimated that eliminating one-third of the conservation measures from their current audit, consistent with applying the 7-year payback criterion, would reduce audit time by 15 percent. These officials estimated that such a reduction in audit time would only reduce total program costs between 2 and 7 percent. Our observation of RCS audits conducted in Iowa and Massachusetts generally confirmed California's estimate of the likely reduction in

---

1/Although DOE officials could not provide any documentation to support projected cost savings, a preliminary analysis conducted by Oak Ridge National Laboratory in June 1981, identified seven possible RCS program changes which, if adopted, could result in a 44-percent reduction in program costs. While we could not determine to what extent, if any, this analysis was a basis for DOE's cost-saving expectations, application of the 7-year payback criterion in this analysis accounted for 80 percent of the total reduction in program costs.

audit time resulting from application of DOE's 7-year payback criterion.

With respect to the application of the 7-year payback criterion, DOE assumed that all fuel prices would remain constant at 1981 levels. Since increasing fuel prices reduce a conservation measure's payback period, some conservation measures which exceed a 7-year payback based on 1981 prices could meet the payback criterion years if fuel prices increased. However, under DOE's application of the criterion, such program measures would not be required as part of the audit. Since, in our view, fuel prices are likely to increase in future years, DOE's application of this criterion could inappropriately eliminate items from an RCS audit.

With respect to post-installation inspections, costs of such inspections under the existing regulations were expected to be only about 1 percent of total program operating costs. Moreover, as discussed on page 17, few post-installation inspections have actually been conducted. Therefore, the elimination of this program requirement would likely have only a negligible impact on program operating costs.

The third item cited by DOE as contributing to its 50-percent cost-savings estimate was reduced requirements in issuing program announcements. In our view, program announcement costs would involve primarily development, printing, and mailing. Development costs are usually nonrecurring initial costs and thus would offer limited opportunity for additional cost savings where the program has already been implemented. Printing costs could be reduced slightly if the length of announcements are reduced, however, some utilities may have already printed enough program announcements to at least partially cover required future mailings. Thus, cost-saving opportunities are further limited. Finally, costs associated with mailing would not appear to be affected since mailings would take place in any event. Therefore, there appears to be little opportunity for cost savings from the proposal to reduce program announcement requirements.

Program effectiveness likely to be reduced for States adopting changes

Most of six proposed rule changes we reviewed, if adopted, could adversely affect the RCS program's effectiveness. Because limited program results data exists and the extent to which States would ultimately adopt such changes is unknown, we were not able to quantify probable impacts. However, our work indicates that proposed changes in the areas of audit comprehensiveness, presentation of audit results, and post-installation inspections could, where adopted, decrease the quality and thus the effectiveness of the audit and ancillary services without a corresponding decrease in program costs. Furthermore, proposed changes in reporting and recordkeeping may impede efforts to monitor and evaluate the program. Proposed changes to auditor training requirements are unlikely to have an impact on the program.

DOE's proposals to reduce audit comprehensiveness is likely to adversely affect the RCS program's effectiveness. Adoption of these proposals, which include the 7-year payback criterion and deleting requirements for informing homeowners of applicable low- and no-cost energy conservation practices, tax credits, and the weatherization program could significantly reduce information available to program participants. Since conservation opportunities not identified and explained to the homeowner are not likely to be realized, we believe that States' strict adherence to the proposed regulations could reduce the program's perceived or actual effectiveness. As indicated in table 2, although most of the 32 States with ongoing RCS programs do not intend to delete requirements for providing information on applicable conservation practices, it is less clear whether they will maintain conservation and solar and renewable program measures not satisfying the 7-year payback criterion.

DOE's proposal to delete the current requirement that audit results be presented in-person and onsite is also likely to have an adverse affect on program effectiveness. Presenting audit results in-person, along with the onsite inspection process, are basic elements in the type of audit this program was designed to provide. As we concluded in a previous report, 1/ combining individualized information with personalized delivery of that information has been shown to result in the greatest amount of voluntary energy conservation by each individual. Therefore, we believe this proposed change would undermine the quality and effectiveness of the RCS audit for those States adopting the change. (See table 2.)

Another change DOE proposed that may adversely affect the RCS program is eliminating the required mandatory and random post-installation inspections. As previously discussed on page 17, few States have an active post-installation inspection program. However, in California which has conducted over 13,000 inspections, problems with materials or installation were identified in over 20 percent of the inspections. Rhode Island also reported finding problems in 152 of 342 inspections conducted.

As an alternative to post-installation inspections, some States are relying on local building codes or consumer complaints to identify possible problems. Based on information obtained in States we visited, relying on local building codes may not represent an effective check on either materials or installation

---

1/"Residential Energy Conservation Outreach Activities--A New Federal Approach Needed" (EMD-81-8, Feb. 11, 1981).

practices. We found that recommended conservation measures are not always included in such codes, and the extent such codes are enforced is unclear. With respect to using consumer complaints to identify problems, we are also concerned that defective products or installation procedures will not often be apparent to the homeowner. For example, identifying problems in the installation of electrical ignition systems and wind energy devices would require a level of specialized knowledge. Furthermore, homeowners would not generally have available the equipment needed to inspect such measures as floor and wall insulation and solar space or water heating systems.

Table 2

Responses of 32 States with Ongoing RCS Programs to Likelihood of Adopting Selected Proposed Changes

Proposed change	Definitely or probably yes	Uncertain	Definitely or probably no	No answer
	(number of respondents)			
Eliminate post-installation inspection	14	5	11	2
Eliminate onsite presentation of audit results	8	2	19	3
Reduce numbers of program measures required for audit:				
--solar and renewables	13	7	9	3
--conservation	11	5	13	3
Eliminate or reduce number of energy conservation practices	5	1	24	2
Reduce auditor training requirements	0	3	26	3
Reduce reporting and recordkeeping requirements	15	4	11	2

DOE's proposal to relax auditor-training requirements is not likely to reduce program effectiveness. This proposal adopts a basic requirement that an auditor must be qualified in place of current specific DOE qualification requirements. Under the proposed basic requirement for auditor qualification, the State would be responsible for developing and implementing the necessary procedures. Based on our discussions with State and utility officials, we believe they are likely to take adequate steps to properly train auditors. In addition, as indicated in table 2, none of the States we surveyed is likely to alter its existing auditor training procedures.

Finally, DOE's proposal to reduce reporting and recordkeeping requirements is likely to hamper efforts to ensure the program is being efficiently and effectively implemented. Under the proposed change, DOE would annually require a narrative evaluation containing only information which is easily derived from available State and utility records. We found that many of the States we contacted could not provide information which is required by regulation to be maintained. For example, as discussed earlier, 15 of 32 States could not provide us information on consumer requests for program-arranging services; information required to be reported to DOE. Our work showed that, if adopted, the new regulations could further erode DOE's monitoring and evaluation of State and utility RCS programs. As shown in table 2, about half the States surveyed are likely to adopt the less restrictive recordkeeping requirements.

Two proposed regulations contain less specific requirements than intended

While NECPA as amended by ESA is clear and unambiguous on how the RCS program would be carried out, the Joint Explanatory Statement of the Committee of Conference reports 1/ contain several expressions of the conferees' intent that were not included in the statutes. Existing RCS regulations reflect the conferees' intent and contain provisions that are more specific than NECPA actually required. Two of DOE's proposed regulations, while consistent with the statute, do not reflect the conferees' intent expressed in the Conference Committee reports.

NECPA requires that State RCS plans include procedures for preparing an approved list of suppliers, contractors, and lenders to assist consumers in undertaking suggested conservation measures.

DOE's existing regulations prohibit regulated utilities from preparing this list, while the proposed regulations delete this restriction. However, the conference report to NECPA states that the person or agency designated in the State plan responsible for

---

1/"National Energy Conservation Policy Act," House Report No. 95-1751, Oct. 10, 1978, pp. 91 to 98; and "Compilation of the Energy Security Act of 1980 and 1980 Amendments to the Defense Production Act of 1950," House Committee on Banking, Finance and Urban Affairs, Committee Print 96-17, Sept. 1980, Part I, pp. 288 to 292.

developing such a list shall not be a regulated utility. Therefore, although DOE's proposal to delete the restriction on regulated utilities from preparing this list does not violate statutory requirements, the proposed change does not reflect the conferees' intent.

In another instance, the proposed regulations do not reflect the conference committee's expectations under the ESA amendments. Specifically, the ESA conferees expected that the States would use information from post-installation inspections to assure that high-quality work was performed and to protect consumers against fraud. Existing regulations provide for post-installation inspections as a means to ensure that material and installation standards and other listing requirements are being met. NECPA does not require that States provide post-installation inspections, and the conference report is also silent with respect to such inspections. The proposed regulations eliminate post-installation inspections and instead require each State to implement whatever enforcement mechanism it deems most effective.

The conference report for the ESA amendments, however, states that the conferees did not include any additional statutory requirements for post-installation inspections because they believed that in complying with NECPA's anti-fraud provisions, States are required to adopt procedures to protect consumers. The conferees believed that at least during the first year of any utility program, it is essential to perform some post-installation inspections to ensure that a high-quality performance is provided by installers or suppliers.

Neither conference committee report addresses the other proposed changes we reviewed, including deleting energy conservation practices and the requirement for in-person presentation of the audit results. Therefore, although the proposed regulations are less stringent than existing regulations, they are not inconsistent with NECPA or any conferees' statement of intent.

SUMMARY AND CONCLUSIONS

More than 3 years after RCS was created, a wide diversity exists in the operational status of State programs, and much uncertainty and confusion surrounds the program's future. DOE's inadequate program management, especially over the past year, has severely hampered progress in achieving the type of nationwide program the Congress envisioned. Furthermore, DOE's revised program regulations, as proposed in November 1981, are unlikely to reduce program costs by 50 percent as expected by DOE and could adversely affect the program's effectiveness.

Our work has shown that DOE failed to fulfill its administrative and enforcement responsibilities under the RCS program. Specifically, DOE has failed to (1) review State plans and issue necessary regulations in a timely manner, (2) implement a monitoring system needed to determine program status and applicable use of its enforcement authority, and (3) enforce its Federal Standby Authority as required by statute. As a result, nearly half of the States either do not have an RCS program or are not implementing the program in a manner consistent with existing regulations or approved State plans.

Limited program budgets and inconsistent staffing support have hampered RCS program development and implementation. The Congress originally authorized $15 million to carry out the RCS program during fiscal years 1979-81. For fiscal years 1979 and 1980, DOE obligated about $5.6 million for RCS activities. In fiscal year 1981, the Congress appropriated $5.2 million, however, about $2.2 million was subsequently deferred. About $3.4 million was made available for planned fiscal year 1982 program activities. This funding level is significantly below the previous administration's fiscal year 1982 budget request of $6.8 million, which was to allow for implementation of key program activities. We also found that despite increasing program responsibilities since the program began, staffing has been reduced from 22 to 8, including several reassignments exchanging experienced RCS personnel for non-experienced staff.

States with ongoing RCS programs have had widely differing program experiences. In addition, we question how the RCS program is affecting consumers. We found that (1) States, and utilities within States, experienced significantly different program participation rates; (2) program costs varied widely among utilities; (3) some utility programs appeared inconsistent with program regulations; (4) audit results in some areas were questionable; and (5) information on consumers' use of program-arranging services was limited. Our findings suggest that utilities are exercising a large degree of flexibility in carrying out the RCS program. In some cases this flexibility has resulted in additional program services, while in other cases, it has resulted in RCS programs being implemented in a manner inconsistent with the regulations.

Proposed revisions to the RCS program regulations are unlikely to result in expected cost savings and may adversely affect the program. Our work indicates that DOE's cost-saving expectations are overstated even if they are adopted by the States. Moreover, to the extent some proposals are adopted by the States, they could decrease the quality of the RCS audit and thus reduce the program's effectiveness.

Although the proposed regulations are consistent with the statutes, proposed changes concerning the (1) prohibition on who may prepare the list of approved suppliers, contractors, and lenders and (2) requirements for post-installation inspection do not reflect the conferees' intent.

Overall, we are concerned about the RCS program's current status. Most of the problems we found could be substantially resolved by appropriate DOE actions. For example, if DOE were to effectively monitor ongoing programs and use its Federal Standby Authority as required by statute, we believe the RCS program would achieve nationwide operational status without the wide degree of program experiences and inconsistencies that now exist.

Over the past year, however, DOE has exhibited an unwillingness to carry out the program, expressing its view that the Federal Government no longer needs to require the RCS program. We believe this unwillingness to carry out the program has been a major influence on the decision of 19 States--and particularly 9 States with approved plans--not to implement the RCS program at all.

An overall Federal position on the RCS program has not been made clear. We recognize that DOE's position is consistent with administration efforts to reduce the cost and burden of Federal regulations. The administration's fiscal year 1983 budget provides no funds for further RCS program implementation or enforcement. With respect to congressional actions, no new funds were appropriated for RCS in fiscal year 1982. On the other hand, the Senate overwhelmingly rejected a proposal to prohibit all RCS funding in fiscal year 1982. Subsequently, Congress made about $3.4 million available from deferred fiscal year 1981 funds for fiscal year 1982 program activities.

The RCS program is at a crossroad. Budget and legislative decisions now before the Congress will determine whether the program will continue to exist, and if continued, the types of consumer services to be provided by utilities under the program. However, if the Congress decides to continue the program in its current form and DOE persists in its reluctance to implement it, States are likely to continue to abandon RCS or excercise a great degree of flexibility in carrying out the program. In either case, congressional expectations for the program are not likely to be met.

COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON D.C. 20548

B-206525

MARCH 9, 1982

The Honorable Philip R. Sharp
Chairman, Subcommittee on Fossil
  and Synthetic Fuels
Committee on Energy and Commerce
House of Representatives

Dear Mr. Chairman:

Subject: The Effects of the Fiscal Year 1983 Budget, Energy Reorganization, and Program Changes on U.S. Energy Emergency Preparedness (EMD-82-45)

Your January 29, 1982, letter requested that we update our analysis of energy emergency preparedness published last September 1/ by looking into the effect of continuing budget and staff reductions at the Department of Energy (DOE). You also asked us to comment on the implications the proposed energy reorganization may have on both domestic and international energy emergency preparedness and to clarify the United States' obligations under the International Energy Program. Lastly, you wanted our view on what actions should be taken to ensure adequate preparedness beyond those covered in S. 1503.

Our September report noted many weaknesses in the Government's energy emergency preparedness posture. Our conclusion was that,

> "The U.S. Government is almost totally unprepared to deal with disruptions in oil imports. Oil import disruptions * * * pose a significant threat to national security, and the lack of effective contingency planning and program development to date is serious and requires immediate attention."

Since then, progress has been slow; there is still no comprehensive plan or even individual response plans in any contingency planning area which can be considered fully operational.

1/"The U.S. Remains Unprepared for Disruptions in Oil Imports," EMD-81-117, Sept. 29, 1981.

(001706)

SUMMARY

As this letter shows, under its proposed budget--which is a substantial reduction from fiscal 1981 and 1982 levels --the administration has chosen to reduce contingency planning efforts in several areas. Specifically, DOE has no plans to

- --develop a surge oil production capability (except for a small capability at the Naval Petroleum Reserve at Elk Hills),
- --develop a Strategic Petroleum Reserve (SPR) drawdown policy,
- --institute a private oil stock management program, or
- --develop voluntary and mandatory demand restraint programs.

Efforts in fuel switching and international emergency preparedness would be substantially curtailed. Additionally, few resources will be devoted to studies of emergency tax/rebate systems that could be used to counter oil price increases even though the previous oil allocation systems have been discarded. The proposed fiscal year 1983 budget for emergency preparedness will further delay the completion of adequate contingency plans.

At this time, the administration has not yet released its energy reorganization plan, so we could not analyze it in detail. Our previous work in emergency preparedness organization 1/ indicated that an effective planning operation needs to: (1) be centralized in one office, (2) be given a high priority, (3) be vested with adequate authority, and (4) have necessary staff available to carry out the program. It is not clear that the reorganized emergency preparedness program will have these characteristics. We note, however, that in one component of energy emergency preparedness--international preparedness--the staff is being reduced from 18 in fiscal 1982 to 6 in fiscal 1983, a reduction of two-thirds. The Department of State's component remains unchanged at 5 staff years.

Senate bill 1503 would help fill a void by giving the President authority to act in an energy emergency. While this would be a step in the right direction, emergency preparedness is more than legal authority. The Government must also have the capability to

---

1/"The Department of Energy's Reorganization of Energy Contingency Planning Holds Promise--but Questions Remain," EMD-81-57, March 4, 1981.

act, and this means having sound contingency plans. Until those plans are developed, tested, kept ready, and can be implemented quickly, the Nation will not be adequately prepared.

We are currently assessing the legal requirements of the United States under the International Energy Program to institute mechanisms for demand restraint and fair sharing. That response will be forwarded to you under separate cover.

SCOPE AND METHODOLOGY

This report updates and supplements the findings of our March and September 1981 reports. Our assessment of the impacts which reorganization and funding reductions may have on energy emergency preparedness is based on criteria developed in these studies, namely, that contingency measures should be fully developed, tested, maintained, and able to be implemented quickly.

To evaluate the impact of budgetary reductions, we analyzed the proposed budgets of several organizations within DOE, specifically the Office of Emergency Preparedness, the Strategic Petroleum Reserve, the Energy Information Administration, and the Office of International Affairs. For guidance on DOE's current contingency planning policy, we also relied on the Department's written response to the recommendations contained in our September report, submitted to the Congress under Section 236 of the Legislative Reorganization Act of 1970. To assess the potential impacts of reorganizing DOE, we examined the information contained in the budget showing which Departments the various DOE operating programs would be assigned. Analysis of the budget was supplemented with information obtained in interviews with officials of the Departments of Energy, Commerce and State. Our evaluation was performed in accordance with GAO's current "Standards for Audit of Governmental Organizations, Programs, Activities and Functions."

WHAT DOES THE NATION NEED TO BE PREPARED FOR OIL IMPORT DISRUPTIONS?

Our earlier report contained recommendations for improvements in five areas of contingency planning. These are:

- --Increasing oil supplies, including
  - --realistic planning for SPR use, including drawdown rates, amounts, timing, and method of distribution;
  - --cooperating with the States in developing plans for surge oil production from Government and private oil fields; and
  - --planning for both needed buildup and drawdown of industry-held oil stocks.

- Substituting for oil, including acquiring needed information and removing constraints to implementing effective emergency programs in
    - switching from oil to gas,
    - switching from oil to coal,
    - increasing electricity transfers,
    - increasing electricity and gas imports, and
    - increasing electricity generation from coal and nuclear.
- Developing adequate emergency demand restraint plans on the Federal and State levels, including
    - consumer information programs,
    - voluntary programs,
    - mandatory programs, and
    - revising the basic law on demand restraint to make planning and implementation more timely.
- Replacing the expired Emergency Petroleum Allocation Act authorities with standby ones to help assure continued oil availability during disruptions, specifically
    - reviewing allocation systems and tax/rebate alternatives and recommending legislation if appropriate.
- Improving the international emergency preparedness program by
    - encouraging higher international oil stock holdings,
    - setting aside some reserves to alleviate small disruptions,
    - reviewing demand restraint and fair sharing programs, and
    - establishing a mechanism to resolve price disputes between International Energy Agency member countries during disruptions.

Whatever specific forms programs in these areas take, they must have four attributes to be effective. They must be fully developed, tested, maintained in readiness and be capable of timely use. Lack of any of these characteristics will result in poor emergency performance or outright failure.

THE PROPOSED FISCAL YEAR 1983 BUDGET FOR ENERGY EMERGENCY PREPAREDNESS

The Nation's largest and most developed energy emergency program is the Strategic Petroleum Reserve. The proposed fiscal year 1983 budget for SPR development and operations amounts to $2.32 billion. These funds are for oil acquisition and transportation, storage facility planning and development, program direction, and other expenses related to the physical operation of the SPR. This report does not deal with SPR operations; that has been the subject of several GAO reports, the most recent one having been published this past December. 1/ In this report, we focus on the policy planning activities which address such issues as when the SPR should be used, the drawdown rate, how the oil should be distributed, and what minimum reserve margin should be kept for extreme emergencies. The Deputy Assistant Secretary for Energy Emergencies is responsible for recommending policy in these areas, while SPR operations are under the authority of the Deputy Assistant Secretary for the Strategic Petroleum Reserve.

The proposed budget for the Emergency Preparedness Program under the Deputy Assistant Secretary for Energy Emergencies contains $5.4 million and 72 staff years. This represents a cut of 47 percent (from $10.3 million) in funds and 23 percent (from 94) in staff from this year's appropriation.

Contingency planning in fiscal year 1982 and 1983 was and will be concentrated in the following areas:

	Staff Year Request	
Programs	Fiscal 1982	Fiscal 1983
Strategic Petroleum Reserve	3 a/	3 a/
--continued development,		
--test of distribution procedures, and		
--studies of its vulnerability.		

1/"Strategic Petroleum Reserve: Substantial Progress Made, but Capacity and Oil Quality Concerns Remain," EMD-82-19, December 31, 1981.

International Programs	6	6
--support voluntary U.S. oil company involvement in International Energy Agency programs, and		
--continued NATO planning regarding emergency oil supply distribution.		
Defense Preparedness	29 a/	22 a/
--complete plan for using Naval Petroleum Reserves,		
--refine plan to implement the Defense Production Act,		
--continue support for the Emergency Mobilization Preparedness Board,		
--continue model development to assess defense related energy requirements, and		
--complete plans to operate non-oil Emergency Reserve Program.		
Public Education/Outreach	3	0
--seminars and technical assistance		
Data Analysis/Studies	33 a/	31 a/
--continue assessment of world situation and potential impact of energy emergencies,		
--continue developing capability to assess the imminence of and potential impact of energy emergencies,		
--continue analysis of free market operations,		
--continue studies of measures to encourage private oil stockpiling, and		
--develop policy options for income transfers during emergencies.		

Electrical Emergency Preparedness --continue assessment of the electric utility network vulnerability to disruption, --continue reporting on electric power system reliability as required under Public Utility Regulatory Policies Act, --continue activities required under the Federal Power Act, and --continue planning for emergency electricity transfers and increased electricity production.	20	10
Total b/	94	72

a/Estimated by GAO

b/Fiscal year 1981 staff year budget was 129. The distribution by program area is not available.

The fiscal year 1983 budget request does not contain detailed funding information for DOE's activities as outlined above. It is even more difficult to translate the limited information into the programmatic categories analyzed in our September report. DOE officials from the offices of the Comptroller and the Deputy Assistant Secretary for Emergency Preparedness informed us that more detailed data do not exist in the emergency preparedness area. Because of time constraints we were not able to develop such information ourselves.

The proposed Emergency Preparedness Program areas with the largest proposed staff allocations are Defense Preparedness and Data Analysis/Studies. These areas constitute an estimated 53 staff years out of the 72 staff year total. However, the program excludes many promising areas which we analyzed in our September report and which we believe are needed to counter disruptions. There are no plans to develop drawdown policy for the SPR or to promote surge oil production. Efforts to design a private oil stock management program, to design emergency demand restraint measures, and allocate oil have been abandoned. No funds are requested for the Fuels Conversion Program, and it is not clear whether there will be any effort to continue developing plans for emergency oil to gas and coal switching.

Unfortunately, there is little likelihood that DOE will make much progress in developing sound contingency plans in these areas without clear signals from Congress. In commenting on our recommendation that the Government develop an SPR drawdown plan, DOE stated that:

> "It is DOE's position that it is neither practicable [sic] nor desirable to prepare in advance an SPR implementation plan * * * if developed and made public, (it) could impair the effective use of the SPR."

In the case of a private stock management plan, DOE said

> "DOE does not concur with this recommendation. Government intervention in the management of private industry stocks during supply shortages is antithetical to the most fundamental principles of the Administration's energy emergency preparedness policy. It interferes with the workings of the market and, therefore, impairs the ability of market forces to allocate resources efficiently and effectively * * * the Department believes further work in this area would be counterproductive."

In our opinion, neither of these positions is supportable. An SPR use plan is desirable so that American companies know they can count on additional supplies and do not panic and flock to the spot market, bidding up prices as they have done during both previous disruptions. Our September report pointed out that the details of SPR drawdown need not be made public, just as the general cutlines of our military planning are publicly available while actual operational plans are secret. As far as practicality goes, the Government plans for numerous military contingencies on an ongoing basis. It strikes us that planning for SPR use would be no more difficult and perhaps much easier than planning for major armed conflict.

Concerning private stock management, we do not advocate Government intervention in private oil stocks during normal times. However, politically caused market disruptions are not normal. During these extraordinary happenings, there is room for industry and government to cooperate in using oil stocks in the national interest. Here, as in most contingency planning areas, collaboration of Government and industry beforehand can pay large dividends during a crisis.

Surge oil production on non-Federal lands has considerable potential as an oil disruption countermeasure, but DOE is devoting only minimal efforts to it. DOE concurred with our recommendation to seek the cooperation of States which have significant surge production potential so that output can be temporarily raised. Responding to our recommendation, DOE said in part:

> "This recommendation is in consonance with the Administration's energy emergency response policy of eliminating regulatory barriers which may inhibit increased domestic oil production in response to supply disruptions."

However, the Department has not initiated any action for this purpose. Considerable effort is needed to remove the many regulatory barriers in advance of disruptions so that an effective surge production program can be instituted quickly when needed.

The benefits of demand restraint planning should not be overlooked. Federal guidance in demand restraint is vital for the effective implementation of other domestic and international contingency programs. Here again, strong DOE leadership is unlikely. The Department's response to our recommendations on ways to improve the Federal demand restraint effort was, in part:

> "DOE does not concur with the first and second parts of the recommendation which imply the use of mandatory federal demand restraint programs. Under the Administration's strategy to deal with energy supply disruptions, mandatory demand restraint programs in a shortage situation will be unnecessary since market forces will serve to allocate petroleum supplies * * * in the most efficient manner. Thus, the Department sees no benefit from a system to monitor State energy use to support such demand restraint programs, nor the need to expand the current Federal Standby Plan."

Use of mandatory demand restraint programs formed only a small part of the recommendations we made in the emergency conservation area. We pointed out that consumer information and voluntary action was preferrable and that mandatory action should be a last resort. We recommended, however, that standby mandatory programs be available for implementation in the event that voluntary programs do not work. The fact is that DOE has abandoned all areas of demand restraint on the Federal level and is not providing guidance for State demand restraint planning.

DOE's proposed Emergency Preparedness Program reflects the administration's policy of relying almost exclusively on market forces to counter disruptions. The 72 staff years for fiscal year 1983 reflect the narrowing of the program. In our view, the main problem is not fewer staff years. Instead, we take issue with what we see as an over-reliance on the market mechanism to the exclusion of other practical initiatives. It is interesting to note that the oil industry also sees the wisdom of a mix of measures. The National Petroleum Council, a DOE advisory group largely made up of oil industry representatives, noted the value of having such a mix of contingency plans in their report. 1/

1/National Petroleum Council, Emergency Preparedness for Interruption of Petroleum Imports into the United States, Washington, D.C., National Petroleum Council, Apr. 1981.

THE EFFECTS OF REORGANIZATION ON EMERGENCY PREPAREDNESS ARE NOT CLEAR

Under the administration's reorganization proposal, emergency preparedness would be transferred to the Department of Commerce. The details of how energy emergency preparedness would be organized in Commerce have not yet been decided. Commerce officials informed us that the energy emergency functions of DOE would probably be combined with similar non-fuels strategic materials functions now performed by Commerce. The combined organizations are slated to be the province of an Assistant Secretary for Strategic and Emergency Planning reporting to the Secretary/Deputy Secretary. Just how energy preparedness would fit into this structure--whether it would be the concern of a deputy assistant secretary as it is now at DOE--has not been resolved.

Because the organizational question is still open, it is difficult to analyze what problems might be created by the new structure. However, our previous work on appropriate organization for emergency preparedness revealed the key factors which must be present in any contingency planning structure to ensure effective planning. Such planning requires centralizing the function in a single office; vesting adequate authority in those responsible for emergency preparedness; making available adequate staff to carry out the program; and finally, giving the entire area the high priority it deserves.

Centralizing contingency planning in one office makes it easier to monitor plan development, guarantee that the programs will complement each other, and assess whether the programs taken together will adequately deal with projected contingencies. Centralization helps avoid problems of timeliness in plan preparation and quality control which can arise if other offices see contingency planning as a lower priority than their main ongoing programs.

DOE responded to the need for adequate centralization when it consolidated contingency planning under the Assistant Secretary for Environmental Protection, Safety and Emergency Preparedness. It is important that centralization be maintained under any reorganization to promote effective coordination.

Whatever official directs emergency preparedness needs the authority to direct other offices to contribute the staff and other resources needed to get the planning and emergency operations jobs done. The precise level that the official has in the formal organization is less important than if top management makes it clear that contingency planning is important, and that other agency officials need to give full support to emergency preparedness when called on to do so.

Adequate staffing for emergency preparedness clearly depends on the scope of the program. Emergency preparedness staff will fall from 129 staff years in fiscal year 1981 to 72 staff years in fiscal year 1983, reflecting the narrowing of the program. We did not have time to do the detailed audit work to evaluate whether 72 staff years were enough to carry out this narrower program. Our main concern is that the program now excludes many potentially fruitful areas for contingency planning.

The priority given any particular program is, of course, largely in the eye of the beholder. DOE officials have stated that emergency preparedness is a high priority. However, we have noted the abandonment of a number of emergency planning areas, the de-emphasis placed on others, and the slow progress in developing contingency plans. This may reflect DOE's concept of appropriate priority; however, we believe that the Nation is not progressing fast enough toward adequate emergency preparedness.

THE PROPOSED BUDGET, REORGANIZATION, AND THE INTERNATIONAL ENERGY PROGRAM

DOE's Office of International Affairs and Office of Emergency Preparedness (EP), along with the Department of State, are involved in representing the United States at the International Energy Agency (IEA). Under a 1974 executive agreement, the United States subscribes to the IEA's International Energy Program, which is largely concerned with international oil sharing in the event of serious market disruptions. 1/

The Secretary of Energy usually heads the highest level IEA ministerial meetings. The Assistant Secretary of State for Economic and Business Affairs usually heads the U.S. delegation to regular Governing Board meetings, but the Assistant Secretary of Energy for International Affairs occasionally acts in that capacity. At DOE, the Office of Energy Consuming Nations in the Office of International Affairs has primary responsibility for staff-level work on IEA issues. These functions include:

--preparing U.S. position papers on various topics coming before the IEA Governing Board,

--coordinating those papers with other U.S. agencies,

--monitoring all IEA functions,

--representing the United States at IEA Standing Group meetings on issues such as emergency sharing, oil market information, long-term cooperation, research and development, and producer-consumer relations, and

---

1/For a review of U.S. participation in the IEA, see U.S. General Accounting Office, "Unresolved Issues Remain Concerning U.S. Participation in the International Energy Agency," ID-81-38, September 8, 1981.

--providing staff assistance for IEA Governing Board meetings.

International Affairs provided approximately 12 professional staff years for U.S./IEA affairs at the beginning of fiscal 1982; EP supplements these efforts with about 6 professional staff years. State dedicated approximately 5 staff years to IEA matters during fiscal 1982.

Several functions for integrating U.S. contingency planning efforts with its IEA commitment are shared by EP and International Affairs. Under the International Energy Program (IEP), the United States is required to coordinate with the IEA's Emergency Sharing System (ESS) and develop a workable plan where U.S. oil companies will share the burdens of that system equitably. The United States is also committed to provide accurate, timely, and reliable data to the IEA for the effective operation of the ESS; coordinate implementation of demand restraint measures; assess the national product supply and demand situation; coordinate with nonreporting oil companies concerning the development of voluntary offers; and issue direct instructions to companies to implement mandatory allocations. In addition, DOE has responsibility for administering a Voluntary Agreement under the Energy Policy and Conservation Act which stipulates circumstances under which U.S. oil companies can participate in IEA activities. DOE, in conjunction with the Federal Trade Commission and the Department of Justice, monitors company involvement in the agreement, primarily through International Affairs and the Office of General Counsel. DOE also provides certain management functions for formal Industry Group meetings, monitors ESS tests, and provides clearances for emergency-related data submissions by oil companies.

The fiscal year 1983 budget would abolish International Affairs. While the functions, staff, and budget of the Office of Emergency Preparedness would be transferred to Commerce, only the functions--but no money or staff--of International Affairs would be transferred. Furthermore, a proposal to increase State Department staff dedicated to international energy (including IEA) matters by 20 staff years and incorporate all DOE international activities was rejected, and no additional staff will be assigned.

The budget proposal asserts, "The international activities which are important to our international commitments and energy security will be conducted as stated by the President and transferred to the Commerce Department." However, International Affairs' functions concerning the IEA are substantial, and it is at best unclear if U.S. obligations to the IEA can be fully discharged under these circumstances.

WHAT ACTIONS ARE NEEDED BEYOND THE AUTHORITIES FOUND IN S. 1503?

The last question in your January 29 letter asked what authorities beyond those contained in Senate bill 1503 would be needed to support development of adequate energy emergency plans. You also asked what actions should be taken by the executive branch to the same end. Our analysis is based on comparisons between the provisions of Senate bill 1503--the Standby Petroleum Allocation Act of 1982--and current contingency programs to determine if they provide a basis for an overall program as we recommended in the September 1981 report.

Basically, we agree with the thrust of the bill; it provides for the authorities needed to prepare, initiate, and implement emergency procedures to counter an energy disruption. Senate bill 1503 includes provisions to: (1) allocate petroleum supplies domestically during a severe supply interruption, (2) include crude oil sharing measures in any contingency plans to fairly distribute sharing burdens among International Energy Program participating companies and ensure equitable distribution of crude among U.S. refiners, (3) encourage the maintenance of inventories and acquisition of secure supply sources, (4) provide for State petroleum product set-aside programs, (5) stipulate that the emergency provisions developed on the Federal level will supersede State laws unless those laws are specifically exempted by the President, (6) extend the authorities found in the Energy Policy and Conservation Act to participate in the International Energy Program, and (7) provide for certain reporting requirements and impact analyses.

Senate bill 1503 goes far toward providing the authority for taking the kind of actions we believe are necessary to cope with an energy emergency. The most notable characteristic of the bill is that it provides for standby allocation to assure oil availability during a disruption. We agree that a standby emergency distribution system is necessary, and noted in our September report that a tax/rebate system may provide a viable alternative to the crude oil and petroleum product allocation system which was in place until October 1981.

While the bill addresses many areas we consider to be necessary for proper contingency planning, Senate bill 1503 provides authority for Presidential control of oil prices as well as supplies. Our September report noted that price controls could be counterproductive and should be avoided if at all possible.

Although we believe that Senate bill 1503 goes quite far in providing the authority for action in an energy emergency, it does not address several issues we consider vital for contingency planning. We believe further congressional action is warranted in the areas of private oil stock management and demand restraint.

The bill stipulates that emergency preparedness programs should encourage the maintenance of high petroleum inventories by refiners. This is fully consonant with our previous recommendation as far as it goes. However, it is completely dependent on the voluntary cooperation of the industry and consumers. The ultimate usefulness of inventories depends on both the Government's ability to provide proper incentives for building adequate stocks and a plan for coordinating their use within an overall contingency plan. The bill does not provide mechanisms for the President to encourage stock building during normal times or to encourage stock drawdown during disruptions. This is an issue where congressional action would be desirable along the lines recommended that in our September report. There, we recommended that the Congress maintain the authority of the Secretary of Energy to require companies to adjust stock levels during energy emergencies and provided legislative language to this effect. Although this is a controversial issue, we continue to believe it is in the national interest for the Government and U.S. companies to work together to utilize stocks for the national good--as they now cooperate internationally under the auspices of the IEA--during disruptions. We are continuing to look into possible stock management policy options at the request of Senator Bradley, a member of the Senate Committee on Energy and Natural Resources.

We believe that demand restraint planning is an important part of emergency preparedness, both domestically and internationally. Senate bill 1503 does not constitute the overhaul of Federal demand restraint that we concluded is needed, relying solely on the Emergency Energy Conservation Act of 1979 (EECA). Our September report discussed the need to amend EECA to streamline the procedures for implementing demand restraint plans. In amending EECA, we recommended that Congress require the States to submit their demand restraint plans to DOE for approval before disruptions; the plans should demonstrate that standby programs exist which could achieve specified results. Our previous report also provided legislative languages for making changes in this area. While amending EECA along these lines would establish a base for better planning, DOE initiative would also be necessary to make demand restraint effective.

Other areas which do not require legislative action but where DOE can take steps to improve readiness are surge oil production, fuel switching, and international preparedness programs. We made recommendations to DOE in all three areas in our September report, but the Department does not intend to develop contingency plans in these areas.

Overall, Senate bill 1503 constitutes a step in the right direction by providing the authority to act decisively in an energy emergency. The bill provides a needed base for emergency preparedness. However, having authority does not mean being prepared. Government must also have the capability to act through developing proper contingency plans. Without adequate contingency plans which are fully developed, tested, maintained in readiness, and capable of being implemented quickly, having the authority to act in a crisis will be insufficient. While this bill gives the Executive authority to act in many areas, it cannot ensure that the needed actions will be taken. It is up to the Executive to implement the legislative mandates for emergency preparedness. Until it does, the Nation will not have the full measure of energy security it needs.

CONCLUDING NOTE

In our view, the prospect for developing a sound emergency preparedness program based on the administration's view of appropriate contingency measures and the proposed budget are meager. No comprehensive or even individual response plans in any contingency planning area have been completed since our review of emergency planning in 1981. The activities planned for fiscal year 1982 will do little to improve preparedness. The proposed budget will lead to fewer emergency preparedness programs, since several contingency planning efforts will be abandoned. The reason for emergency preparedness planning is clear. Relatively modest attention to contingency measures holds great promise for mitigating the worst effects of disruptions. For example, a recent study on the SPR pointed out that a 3 million barrel per day import shortfall in 1984 would cost the economy over $200 billion, 15 percentage points more inflation, and 2.5 million jobs. 1/ Clearly, expenditures for contingency planning in the millions of dollars and strategic oil stockpiling are prudent investments in national security. On the basis of DOE's performance to date and its plans for the coming year, we question whether energy emergency preparedness is receiving the priority it deserves.

- - - -

As requested by your office, we did not solicit agency comments on this report. Copies of this report are being sent to the Secretaries of Energy, Treasury, and State; and the Director, Office of Management and Budget. Copies will also be available to other interested parties who request them.

Sincerely yours,

Charles A. Bowsher

Comptroller General
of the United States

1/Subcommittee on Energy and Power, Committee on Interstate and Foreign Commerce, U.S. House of Representatives, "An Evaluation of the Strategic Petroleum Reserve," Washington, D.C., GPO, June 1980.

THE REAGAN ENERGY PLAN:

A Major Power Failure

March 24, 1982

From a coalition of energy, environmental, scientific,
and consumer groups representing millions of Americans.

THE REAGAN ENERGY PLAN

- -

A MAJOR POWER FAILURE

A Report From

CENTER FOR RENEWABLE RESOURCES
COUSTEAU SOCIETY
ENVIRONMENTAL ACTION
ENVIRONMENTAL ACTION FOUNDATION
ENVIRONMENTAL DEFENSE FUND
FEDERATION OF AMERICAN SCIENTISTS
FRIENDS OF THE EARTH
NATIONAL AUDUBON SOCIETY
NATURAL RESOURCES DEFENSE COUNCIL
THE NUCLEAR CLUB, INC.
NUCLEAR INFORMATION AND RESOURCE SERVICE
SIERRA CLUB
SOLAR LOBBY
UNION OF CONCERNED SCIENTISTS

MARCH 24, 1982
WASHINGTON, D.C.

PREFACE

Unbearably expensive, socially disruptive, and needlessly damaging to the long-term national interest, President Reagan's energy policies represent a major retreat from the progress of the past few years toward a sensible national energy policy. As this report documents, the Administration is ignoring public and expert opinion. It is abandoning programs for increasing energy efficiency and the use of renewable energy resources to meet U.S. energy needs and promoting, instead, energy technologies that are less reliable and more expensive.

During the past year, the Administration has acted irrationally and irresponsibly by cutting federally sponsored conservation and solar programs, disregarding environmental and economic values in the leasing and development of federal energy resources, and proposing increased subsidies to nuclear energy--one of the most costly and dangerous of available energy sources.

We are alarmed that so few Americans are aware of the immediate costs and long-term significance of the Administration's energy proposals. We believe that our energy problems can only deepen and become more intractable if the public does not press Congress and the Administration to back out of ill-advised commitments to nuclear power and to vigorously support more reliable and economic energy sources. This report tells why.

TABLE OF CONTENTS

PREFACE.. iii

I. INTRODUCTION...1

II. PORTRAIT OF A FACT-BLIND ENERGY POLICY...................7

At What Price Nuclear Power? 7

Regulatory Reform--A Solution In Search of a Problem......9

Nuclear Bombs from Nuclear Power..........................10

The Breeder Reactor--Unnecessary and Uneconomic..........12

Aiding the Spread of Nuclear Weapons......................14

Radioactive Wastes--Rushing to Failure....................15

The Federal Hard Sell of Nuclear Power....................16

The Last Word on Nuclear Power............................17

The Reagan Conservation Initiative: Dismantling the Federal Program..18

Market Imperfections 20

Energy Subsidies 24

Solar Eclipse 25

The Rawest Deal...26

What's Needed...28

III. TOWARD A RATIONAL ENERGY POLICY.........................30

Increasing National Energy Efficiency.....................30

Laying the Foundations for a Solar Economy................34

REFERENCES..39

I. INTRODUCTION

In policy statements, budget proposals, and administrative actions the Administration has gradually revealed its vision of what American energy policy should be and where the Nation's energy development efforts should be focused. It has become clear that the Administration believes that the nation's energy problem is one solely of increasing energy supply. In adopting this view the Reagan Administration fails to understand that our needs are not for fuels themselves, but for the services they supply. Warmth, mobility, lighting, goods--these are the desired results, and our national objective ought to be to supply these services as efficiently as possible. Moreover, it is clear that these basic needs can be met in many different ways, some of them far more economic and less risky than others.

Unfortunately, no evidence indicates that the Reagan Administration understands the real nature of the energy problem. Nor that it has attempted to analyze the benefits and costs of alternative approaches to dealing with the challenge. Rather, having made up its mind, the Administration appears determined not to be confused by facts. With uninformed certainty, it is

-Increasing reliance on nuclear fission, encouraging the introduction of a global plutonium economy;

-Accelerating and subsidizing the production of oil, gas, coal, synthetic fuels, and oil shales by sacrificing environmental protection, reducing local participation in leasing decision making, underpricing national energy resources, and providing long-term economic subsidies;

-Drastically truncating federal support for increasing national energy efficiency and the use of renewable energy resources; and

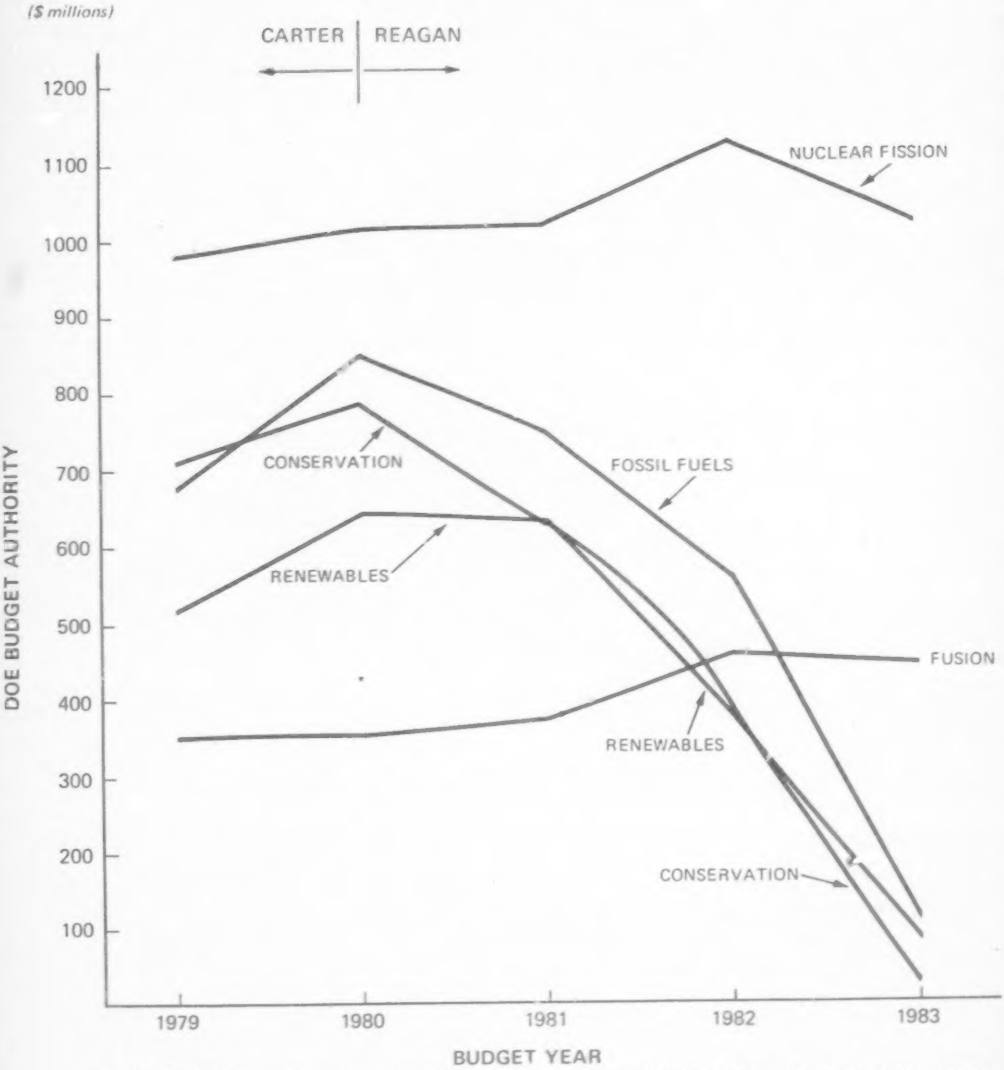
-Cutting back energy-assistance programs for those hardest hit by rising energy prices.

By almost any measure--economic efficiency, national security, impacts on inflation, effects on employment, environmental damage--these proposals amount to putting the worst first. The damaging effects of these decisions will be felt for many years and in many ways.

While the Administration's budget for the Department of Energy (DOE) by no means presents a complete picture of its intentions, it shows clearly enough the Administration's energy priorities. As the figure on the next page shows, DOE funding for solar energy and conservation programs has fallen sharply since 1980. If the Administration's budget proposals for fiscal year 1983 are accepted, conservation programs will be cut by 98 percent from the 1980 level, renewable resources by 86 percent, and fossil fuels by 87 percent. These cuts clearly reflect the President's policies,[1] and had Congress not opposed even deeper cuts, the damages would have been worse still. Nuclear energy is the Administration's choice energy source. The President would have the nation grow more and more dependent on fission-based nuclear power, a very troubled energy source indeed.

The vision that emerges from these budgets and the policies they reflect is not one most Americans share. A recent NBC poll, for example, shows that the American public overwhelmingly believes that "the future energy needs of the United States would be better served...by more conservation and expansion of other energy sources," with greatest popular support for solar energy development.[2] The poll also found that a majority (56 percent) of Americans believe that no new nuclear plants should be built in this country. A second, exhaustive study by researchers at the Washington State University found that "the public does not show the same enthusiasm for nuclear energy as the Reagan Administration or the nuclear industry, and simultaneously appears most

TRENDS IN FEDERAL ENERGY FUNDING



SOURCE: Subcommittee on Energy Conservation and Power, Committee on Energy and Commerce, U.S. House of Representatives receptive to the very energy sources--especially solar and conservation--which the administration is deemphasizing."[3]

The Administration's energy policies clash even with its own avowed free-market principles. The White House is pushing for expanded reliance on nuclear energy, even though a host of unresolved safety, reliability, and waste-disposal problems make nuclear energy ever less economic.[4] Rather than allowing the market to decide the case of nuclear power, however, the Administration is seeking to subsidize it directly by allocating public funds and indirectly by relaxing safeguards aimed at protecting the public health and safety. At the same time, President Reagan is withdrawing virtually all federal support for market-improving programs that supply consumers and American business with investment information and assistance.

The Administration's energy policies are at odds with Americans' concerns about the economy, the environment and the threat of war. White House energy proposals will worsen our already serious economic problems. U.S. energy bills have risen from 8.5 percent of the Gross National Product in 1973 to about 15 percent in 1980. Total expenditures for energy now amount to about $400 billion annually--nearly $2000 for every man, woman, and child. By subsidizing nuclear power and synthetic fuels and ignoring the message of the marketplace, the Administration will greatly increase the economic burden borne by U.S. energy consumers. If they have to pay needlessly high prices to meet basic needs, consumers will have less discretionary income and a lower standard of living.

The Administration's "produce, produce, produce" philosophy only compounds this problem by directing limited capital resources into the search for ever more expensive oil and gas supplies rather than to far more cost-effective investments in energy efficiency. As billions of dollars are channeled into uneconomic and unproductive technologies, less capital will be available for stimulating economic growth, spurring technological innovation, and increasing industrial productivity. Like the enormous budget deficits that the Administration is proposing, these demands for capital will generate upward pressures on interest rates, exacerbating inflation and thwarting economic recovery.

The Administration's energy policies threaten the environment, an issue that continues to rank high in importance with the American public. By continuing support and subsidies for synthetic fuels, the Administration is jeopardizing the environmental health of states that produce coal and oil shale. Synthetic fuel plants pose many poorly understood environmental and occupational hazards ranging from air- and water pollutants to toxic wastes.[5] Common sense dictates a go-slow approach. Yet, the Aministration has approved the subsidized construction of synfuel plants and has severely cut the Environmental Protection Agency just when its regulatory oversight is most needed.[6]

Serious socioeconomic impacts from synfuels development can also be expected in the western states, which contain most of our coal and oil shale. Without careful planning, the heritage and character of the West will be irretrievably lost to boom towns and industrial development.[7] Implementation of the Administration's proposed programs would undo a decade's progress toward improving the quality of America's air, water, and soil, and toward maintaining the productivity of its other natural resources.

Finally, the Administration's energy program increases the risks to national and global security, thereby ignoring the growing concern among Americans over the threat of nuclear war. Its commitments to plutonium reprocesssing and the Clinch River Breeder Reactor increase the likelihood of international nuclear weapons proliferation. And its retreat from energy conservation and solar energy development increases the likelihood we will go to war to maintain access to foreign oil supplies, most notably in the Middle East.

The following pages set out in more detail the elements of the Administration's solar, conservation and nuclear energy proposals and the reasons why they are largely counterproductive in dealing with our underlying energy problems. (The Reagan Administration's reckless leasing of public lands, as well as other actions related to developing and using fossil fuels, will be covered in the forthcoming report, "Indictment: The Case Against the Reagan Environmental Record.") Section III sketches an alternative energy program--one that would help the United States meet its energy needs in the most cost-effective way possible and support such other important national goals as economic growth, national security, full employment, environmental protection and social justice.

II. PORTRAIT OF A FACT-BLIND ENERGY POLICY

Over the past fourteen months the Administration has rewritten U.S. energy policy. Radical changes--from drastic budget cutbacks at the Department of Energy to the wholesale revision of environmental regulations--have touched every major energy-related federal program.

At What Price Nuclear Power?

In October of 1981, President Reagan called for a major federal effort to revive the nearly moribund U.S. nuclear power industry. According to the policy statement, "One of the best potential sources of new electrical energy supplies in the coming decades is nuclear power," though "the Federal Government has created a regulatory environment that is forcing many utilities to rule out nuclear power as a source of new generating capacity,..." "Nuclear power," the statement reads, "has become entangled in a morass of regulations that do not enhance safety but that do cause extensive licensing delays and economic uncertainty." The Administration concludes that we "must move rapidly to eliminate unnecessary government barriers to efficient utilization of our abundant, economical resources of coal and uranium."[8]

The Administration obviously believes that Federal regulations--not substantive technical, safety, and economic problems--have caused the demise of the nuclear industry. Its proposals for dealing with this perceived problem include reducing federal safety regulation over nuclear power, constructing the Clinch River plutonium breeder reactor, encouraging private firms to reprocess spent fuel (possibly for sale to the government, which could use the the recovered plutonium for nuclear weapons production), "swiftly" deploying the means of storing radioactive wastes, and launching a multi-million dollar propaganda campaign aimed at improving nuclear power's public image.

The Administration's zeal for nuclear power emerges clearly from its budget proposals. Nuclear energy constitutes the only important energy program spared deep cuts from the Reagan budget axe. In the President's 1983 budget proposal, nuclear energy--fission and fusion--would receive a total of $1.4 billion, and nuclear research and commercialization programs would account for 87 percent of the Department of Energy's research funds for energy technology.[9]

The irony is that the Reagan Administration's commitment to "reviving the nuclear industry" comes at a time when energy economists have all but declared the industry dead because of the bleak outlook for new orders. A decline in the growth rate of electricity demand, increases in interest rates, cost overruns, construction delays, heavy competition in capital markets, and a growing realization among utilities of the economic and safety risks posed by reactors have resulted in a five-year de facto moratorium on reactor orders and the cancellations of plans for more than 81 reactors, more than now operate in the United States.[10] In fact, the nuclear industry's only current U.S. business consists of a backlog of orders from the early 1970s, when plants could still be built for less than $1 billion apiece and nuclear electricity could still compete economically with coal-generated electricity--as it never will again.

Utilities with heavy investments in nuclear power are faring worse than other electric utilities, few of which still enjoy Wall Street's blessing since their return on investment dropped to an uninviting 11 percent. Investors are increasingly wary of what has been called a "business that can lose $2 billion in half an hour." In the last six months, utilities have scrapped investments in 13 large reactors to keep their losses in the hundreds of millions instead of billions, and thus restore their financial credibility.[11]

Regulatory Reform--A Solution In Search of a Problem

In October of 1981, the Administration called for measures to streamline nuclear plant licensing, citing a need to cut costs associated with construction and licensing delays. Following the Administration's lead, the nuclear industry placed full-page newspaper ads claiming that 33 nuclear plants could be licensed over the next two years if only the federal bureaucracy could be prodded into action. Supposedly, such administrative bungling costs consumers billions of dollars per year. The facts say otherwise, however. Nuclear Regulatory Commissioner Victor Gilinsky contends that no more than 20 of the 33 plants are likely even to be completed within this period.[12] And the most recent NRC report to the House Appropriations Subcommittee (the so-called Bevill report) lists only one plant as likely to be finished before its license is approved, and even then for only two months.[13]

What the Administration fails to acknowledge is that the construction of many nuclear plants is being delayed or deferred for reasons other than regulatory requirements. The real reasons include reduced growth rates for power, difficulties in financing, construction mistakes, late parts delivery, and labor problems.[14] To misconstrue these cancellations, delays, and deferrals as products of a "morass of regulations" is to mislead the public.

If the Reagan proposals are adopted, the real problems that plague the industry--poor management and lack of quality control--may well go untreated. As Nunzio J. Palladino, the new chairman of the NRC said in a December 1981 speech to the Atomic Industrial Forum:[15]

> If the nuclear industry does not do its part, no amount of regulatory reform will save it from the consequences of its own failures to achieve the quality of construction and plant operations it must have for its own well-being and for the safety of the public it serves. Based on quality assurance failures that have

> recently come to light, I am not convinced that all of the industry has been doing its part...Their deficiencies in quality assurance are inexcusable...There have been lapses of many kinds--in design analyses resulting in built-in design errors; in poor construction practices; in falsified documents; in harassment of quality control personnel; and in inadequate training of reactor operators.

Nuclear Bombs From Nuclear Power

In his October statement on nuclear power, President Reagan also lifted the ban on commercial reprocessing of spent nuclear fuel. In so doing, he ignored important lessons from the history of the reprocessing issue. In October of 1976, President Ford determined that commercial reprocessing of spent nuclear fuel, and the subsequent use of the recovered plutonium in existing nuclear power plants, should be held in abeyance until the adequacy of non-proliferation safeguards could be demonstrated. In April of 1977, President Carter went one step farther and deferred indefinitely the commercial reprocessing of spent fuel and the introduction of the plutonium breeder reactor. Both Presidents recognized that worldwide reprocessing could accelerate the spread of nuclear weapons by opening up trade in plutonium, the explosive material from which nuclear bombs can be made. Apparently, President Reagan does not share the same concern.

Commercial reprocessing is widely recognized by the nuclear industry as an uneconomic enterprise. With uranium prices falling, there is little or no economic advantage to using the recovered plutonium as fuel for light-water reactors.[16] Nor can reprocessing be justified for use in plutonium breeder reactors, whose commercial prospects are remote indeed. In fact, within days of the Administration's announcement of its support for reprocessing, Allied Corporation--part owner with the General Atomic Company of the partially completed reprocessing facility in Barnwell, South Carolina--announced that it was writing the facility off its books.[17] Clearly, the Administration's position cannot be justified on economic grounds: left to itself, reprocessing would simply not survive in a free market.

Motives other than energy production have been suggested as justification for the Administration's policy. One is using the plutonium recovered during reprocessing to support the greatly stepped up production of nuclear weapons initiated by the Administration.[18]

Using the plutonium from commercial spent fuel to build nuclear weapons would break down the strategically and diplomatically critical distinction between the civilian and military uses of nuclear materials. It would also pose the risk that radioactive waste management and disposal would be removed completely from civilian oversight, with the subsequent loss of NRC licensing, public comment and review.

The gravity of this radical change in policy is widely recognized. In July of 1981, the Natural Resources Defense Council charged that "the Administration is embarking upon a perilous program to turn commercial nuclear power plants around this country into bomb making factories...which is totally inconsistent with 30 years of American efforts to assure that 'peaceful' nuclear materials and technology are not directed to the manufacture of atomic bombs."[19] Paul Leventhal, President of "The Nuclear Club, Inc.," an organization opposing the spread of nuclear weapons, told the New York Times that this breech would "render meaningless [those] efforts by the United States to dissuade foreign governments from using their commercial nuclear facilities to provide a weapons option."[20] Even a member of the American Nuclear Energy Council objected to what he saw as a "public relations disaster." "We've spent years," the Council official said, "reassuring the public that nuclear power is separate from nuclear weapons."[21]

The importance of preventing the spread of nuclear weapons seems to elude the Reagan Administration, which is abandoning policies that recent administrations regarded as essentials to a sound nuclear policy. In place of the example the United States set by enforcing the reprocessing ban, President Reagan intends to rely upon handshake diplomacy bolstered by International Atomic Energy Agency monitoring, widely recognized as inadequate to the task.[22] Nothing keeps this approach from disintegrating into mere international business deals, with government going to bat for U.S. nuclear firms rather than serving the broader interests of the American people or world peace.

If the United States turns its commercial power plants into production facilities for nuclear weapons materials, what is to keep other nations from following suit? An enhanced weapons build-up would inevitably follow, as would a greatly increased risk of their use.

The Breeder Reactor--Unnecessary and Uneconomic

Perhaps the most extreme waste of federal energy dollars that the Administration has proposed is funding for the Clinch River Breeder Reactor. This highly controversial project, first proposed in 1970 with a price tag of $500 million, to date represents a billion-dollar investment, and the pre-construction estimate of its cost now stands at $3.5 billion.[23] The Reagan Administration has called for $194 million for the Clinch River Breeder in 1982 and $252 million in 1983.[24] Though apparently now favoring construction of the plant, in 1981 the prominent nuclear advocate Edward Teller described the Clinch River reactor as already "technically obsolescent" and "thoroughly inconsistent with badly needed economy in government."[25]

The Administration's rationale for funding the Clinch River Breeder Reactor sounds simple: the nuclear economy would become self-perpetuating if it shifted its base from reliance upon existing light-water reactors to reliance on breeder reactors, which are more efficient users of fuel. But self-perpetuating at what cost? According to a recent study by the Department of Energy's Los Alamos Scientific Laboratory, uranium prices--currently around $25 per pound--would have to reach about $165 per pound for the breeder to compete with light-water reactors.[26] Nor is Los Alamos a lone voice in the debate over the breeder's economic future. Recent House hearings indicate that with the use of more uranium-efficient light-water reactors the break-even price would have to rise to at least $200 per pound.[27] The Wall Street Journal predicts that breeder reactors will not compete economically until "2030 or beyond."[28] Even David Stockman (as a Congressman) called the Clinch River Breeder Reactor "totally incompatible with our free market approach to energy policy," and so it remains.[29] And in late 1981, DOE's own Energy Research Advisory Board advised Energy Secretary James Edwards to cut off funding for Clinch River on grounds that the project is "not an urgent priority" and that the United States has enough coal and uranium to satisfy electrical demand until at least 2020.[30]

The poor economic outlook for the breeder is vividly confirmed by the European experience with advanced breeders. Five years ago, France was committed to building six 1200-megawatt "Superphenix" breeder reactors. As the first of these power plants nears completion, however, it has become clear that high construction costs make the breeder far too costly, about twice as expensive as French light-water reactors.[31] As a consequence, the French have made no further commitment to constructing the five remaining breeders. In West Germany, the Parliament will decide this year whether the 300-megawatt demonstration breeder, which has been under construction for 8 years, will be completed. And the United Kingdom has no present plans to build a commerical-scale breeder reactor.

Even the U.S. nuclear industry is unwilling to risk its capital on breeders. Its commitment to the Clinch River Breeder still stands at the original $257 million that it agreed to contribute in 1970, when the nuclear venture was being cost-shared on a 50-50 basis.[32] Only if taxpayers end up covering more than 90 percent of the project and bear the burden of a 13.5 percent "real" annual rate of cost increase in building nuclear reactors will the industry buy into breeders.[33]

In encouraging the deployment of breeder reactors, the Administration also ignores the threat they pose to world peace. Consider that each year a single breeder reactor reprocessing plant would discharge enough plutonium to make 10,000 nuclear weapons--about equal to the total U.S. arsenal of strategic nuclear weapons.[34] A global economy utilizing several thousand breeder and light-water nuclear power plants would need perhaps sixty fuel-reprocessing plants, each year reprocessing enough plutonium to make 200,000 nuclear weapons.[35] Can there be any doubt that the circulation of this much plutonium will hasten the spread of nuclear weapons? And that with their spread their use will become more likely?

Aiding the Spread of Nuclear Weapons

The Administration's insensitivity to the link between nuclear power and nuclear weapons also reveals itself in a number of its other nuclear power related policies. During the past year, the United States has virtually abandoned its tough stance on slowing the spread of "sensitive" nuclear technologies--those that could be used to help make nuclear weapons. Instead, it has taken a weak position based on its leverage as a "reliable nuclear supplier." During the past year it has lifted the ban on supplying military and economic aid to Pakistan, a country known to be developing nuclear weapons. Having softened its stance, the United States also has under review policies to[36]

-Export classified technology for enriching uranium, technology that would directly allow the acquisition of weapons-grade nuclear materials, and

-Allow India to reprocess U.S.-supplied nuclear power plant fuel, even though that nation refuses to subject its entire fuel cycle to international safeguards.

The Administration expresses legitimate concern about the strategic arms race and the growing threat of nuclear war between the superpowers. Yet, its various nuclear policies could enable many non-nuclear nations--including some that are politically unstable and reckless--to become major nuclear powers.

Radioactive Wastes--Rushing to Failure

The Administration's position on radioactive wastes is that "...there is no question that technically acceptable means of disposal exist..."[37] In fact, in October of 1981, President Reagan directed DOE Secretary Edwards to work "...closely with industry and state governments, to proceed swiftly toward deployment of means of storing and disposing of commercial high-level radioactive waste."[38] The stark facts, however, are that no proven means of safe disposal exist and that many of the technical and scientific problems of waste disposal are just beginning to be addressed. These problems have been outlined in several recent reports. The U.S. Geological Survey concluded that "the difficulties and uncertainties connected with the geologic disposal of high-level waste" represent "significant potential stumbling blocks that need critical attention."[39] The Survey's report describes in detail the areas of needed research, which has only recently begun to be undertaken. Similarly, a year-long government-wide study undertaken during the Carter Administration concluded that the waste problem is one "whose resolution will clearly require an unprecedented extension of capabilities in rock mechanics, geochemistry, hydrogeology, and long-term predictions of seismicity, volcanism, and climate."[40]

Gradually, progress is being made, but important technical problems still await resolution. Questions remain about the reliability of long-term geological predictions, the consequences of interaction between water and the host rock in a repository, the relative value of different waste forms, and the potential for identifying acceptable geological sites.

The Administration proposes pushing ahead with the burial of radioactive wastes before an adequate scientific basis for doing so has been established. But without a credible scientific foundation and without public support, it should be prepared for another technological fiasco like the Lyons, Kansas, project--the original "demonstration" of nuclear waste disposal technology, which had to be abandoned in 1972 because of poor planning and technical incompetence.[41] Developing safe disposal technology will take time, and burying wastes prematurely could prove to be dangerous and costly. It is a job better done well than fast, whatever the industry may believe about "out of sight, out of mind."

The Federal Hard-Sell of Nuclear Power

Rather than dealing directly with the substantive safety and reliability problems plaguing the nuclear industry, the Reagan Administration has proposed costly and largely irrelevant programs, buttressed by a multi-million dollar federally funded public relations campaign.[42]

In late 1981, a lengthy and startling DOE memo was leaked to the press. In it were proposals to promote nuclear power through a series of "public information" activities. Op-ed articles, interviews, media appearances by DOE spokesmen, ghost-written articles for periodicals, briefings for the financial community, joint PR efforts with nuclear trade organizations, support for preparing pro-nuclear materials for use in community and campus forums--these and many other activities paid for with public funds were proposed to help change public opinion on the nuclear power issue. Indeed, DOE even proposed enlisting the National Academy of Sciences to "play a role in nuclear energy public information."

The Administration's proposed pro-nuclear PR campaign is aimed at a public growing increasingly skeptical of nuclear power. According to a poll taken last November by NBC and the Associated Press, when asked to choose between conservation and other energy sources, and nuclear power, 63 percent of Americans polled picked the former, and only 18 percent picked nuclear.[43] Other polls show that between 90 and 95 percent vigorously support solar energy, regardless of their position in the conservation versus nuclear debate.[44] Ranking their preferences, Americans placed nuclear power last.[45]

* * *

The Last Word on Nuclear Power

Nuclear power's demise in the marketplace reflects reduced electric growth rates, rapidly escalating capital costs, and unsolved problems related to plant safety and radioactive waste management. The technology was rushed into being by federal subsidies--chief among them, the Price Anderson Act, which essentially absolved the nuclear industry of liability for major accidents.[46] Without this subsidy the debate over the dangers inherent in nuclear power would not have persisted even this long because, quite simply, the nuclear era would never have begun.

Nothing that the Administration has proposed will deal constructively with these underlying problems. Indeed, the problems plaguing the industry could be made worse by ignoring them, or "demonstrating" solutions when none exist. "Streamlining the licensing process" when there are essentially no plants being delayed by the regulatory process, encouraging fuel reprocessing when it is patently uneconomical and poses a major proliferation threat, building the Clinch River Breeder Reactor when breeders are many decades from being economically viable, proposing deployment of partially developed waste disposal technology, and attempting to whitewash nuclear problems through a federal PR program--these actions serve neither the long-term national interest nor the interest of the nuclear industry. The nation would do far better to pursue energy efficiency, solar energy, and other economically and environmentally attractive energy options that the Administration has so far neglected.

The Reagan Conservation Initiative: Dismantling the Federal Program

When the President stated shortly after his election that conservation meant being too hot in summer and too cold in winter, many dismissed the remark as mere rhetoric. Now, we know it was not. The budget for energy conservation has been reduced 97 percent since the President took office, from $925 million to a proposed $22 million for fiscal year 1983.[47] In the Administration's listing of the worst 20 federal regulations, two conservation regulations--the Building Energy Performance Standards and the Residential Conservation Service--were included.[48] And two other congressionally mandated regulations, appliance efficiency standards and new automobile efficiency standards, are likely to be weakened. Finally, the Administration slated for elimination the existing 15 percent residential energy-conservation tax credit, a proposal that was withdrawn only after 266 members of the House and 62 members of the Senate signed a resolution opposing such a move.[49]

Regrettably, the President's view that efficiency means deprivation and "doing without" demonstrates a fundamental misunderstanding of the term. Efficiency means doing more with less, and not simply doing with less. It means meeting our needs for lighting, warmth, mobility and industrial process energy in the most economic and efficient manner possible. Conservation involves technology just as much as supply alternatives, and requires research, investment, marketing, and consumer acceptance. And like supply technologies, conservation technologies are also evolving. In the future, homes will require less energy for heating and cooling, automobiles will use much less fuel, and factories will produce the same quantity of goods with much less energy. In short, conservation means increasing energy productivity, and therefore national productivity--a goal that the Administration has every reason to embrace.

The Administration's disdain for increasing energy efficiency flies in the face of indisputable evidence that efficiency represents the cheapest, safest, and quickest way to meet U.S. energy needs. Reports issued by such diverse groups as the Solar Energy Research Institute, the National Academy of Sciences, the Mellon Institute's Energy Productivity Center, the Harvard Business School, and others all endorse conservation as a necessary element of a sound energy future.[50] Indeed, these studies establish that "efficiency supplies" are currently available at prices equivalent to yesteryear's oil prices--$1 to $25 per barrel.[51] They also demonstrate that with an aggressive program to improve energy efficiency, U.S. energy consumption in the year 2000 could actually be reduced below what it is today.[52]

Energy conservation has become critical to the health of our economy, as well as our national security. Between 1973 and 1980, U.S. energy consumption rose by a total of only 2 percent.[53] Over this same period, real Gross National Product--corrected for inflation--rose by 18 percent.[54] Thus, almost

90 percent of the economic growth during these eight years was supported through increases in national energy productivity and only 10 percent through the introduction of additional energy sources.[55] The temporary world oil glut we are now enjoying, along with the price stability it has brought, is due largely to conservation efforts.

Its conservation policy shows that the Administration misunderstands the existing energy market in two fundamental ways. First, the free market is not perfect, and as a result billions of dollars of cost-effective efficiency investments are not being made.[56] And, second, the U.S. energy market has been substantially distorted over the decades to favor conventional energy production over conservation. Tax incentives for energy production, for example, outweigh those for conservation by eight to one.[57]

Market Imperfections

High energy prices can induce energy consumers to conserve, but only if they have access to information on how to do so. Right after the Arab Oil Embargo, energy consumers began to implement the "easy" conservation--they turned off unneeded lights and insulated their hot water heaters. But, in the years since, they have had to turn to more substantial conservation measures, and here they have encountered problems. Much of the information on conservation is conflicting and consumers get little help deciding what to believe and what to do. Naturally, many choose to do nothing rather than risk making a mistake.

Congress has attempted in the last few years to meet this need for consumer information. The Residential Conservation Service (RCS) was created to compel utilities to provide energy audits of the homes of interested customers.[58] Appliance labeling for energy efficiency was mandated, as has been done for automobiles.[59] Seminars and brochures were prepared by the

Department of Energy on how to improve energy efficiency in industrial and transportation systems. While it is difficult to gauge the overall effect of these programs on energy consumption, consumer response has been quite favorable. Yet, all of these programs are slated for extinction by the Reagan Administration.

Apart from the question of information, energy consumers can reduce their demands for energy only if conservation technologies are available. Yet, unless adequate resources are devoted to their research and development, such technologies will never become available.

In a number of areas, the resources devoted to conservation research and development are woefully inadequate. The reasons are severalfold. Some industries, such as as the building industry, are diffuse and have no centralized organization to support research. Others are in such poor financial health that they have no capital to devote to conservation. Still other industries will not invest in research because the payoffs are too far in the future. Under such circumstances, many opportunities to improve national energy efficiency will be lost unless the government provides the needed support for research on new conservation technologies. Such energy efficient products as heat-pump water heaters and solid-state ballasts that improve the efficiency of fluorescent lights would not have appeared on the market nearly as soon as they did without federally supported research.[60] Congress has appropriated funds for such research, but the Reagan Administration plans to eliminate these important programs.[61]

In addition to a lack of adequate information and research, there are other factors inhibiting efficient operation of the marketplace. Chief among these is the failure of many institutions to accept energy conservation. For example, while about one third of all Americans live in rental housing, a lack of incentives keeps both tenants and landlords from making conservation improvements. Tenants are reluctant to pay for improvements in the landlord's building, while landlords can simply pass through fuel costs in the rent and so have little incentive to make efficiency improvements. This is a serious problem, and one that the government could help solve. Unfortunately, the Administration has made no move to do so.

Nor is the building sector alone in facing institutional barriers. While industry has made impressive progress over the past few years, it has by no means made all the improvements that are cost effective. A study carried out by the Department of Energy last year estimated that less than one fifth of the reduction in industrial energy consumption (measured per unit of industrial output) has been due to investments in energy efficiency. Most industrial conservation efforts have been limited to "housekeeping improvements" or to shifts away from products that require a great deal of energy to manufacture. The reasons for this are simple. Corporations face many of the same problems that homeowners experience--high interest rates, lack of credible sources of information, and other competing priorities, such as attempting to maintain market share with new products. Accordingly, industrial decision-makers have tended to apply more stringent investment criteria to conservation improvements than they do to other investment opportunities. As a result, many otherwise attractive investments in energy efficiency have not been made. The federal government could--through information dissemination, for example--begin to deal with these problems but under the Administration it isn't.

Present electric rate structures in many states also pose a barrier to efficient market operation. New power plants are very costly to build and the power from them will be more expensive than power from existing plants. If electric rate structures fail to reflect the higher costs of meeting new growth in demand, consumers--particularly those with large and growing demands--will receive price signals that encourage them to use more electricity than is economically efficient. The epitome of this problem is the outmoded "declining block" rate structure, whereby price per unit of power declines with increasing use. New rate structures that encourage the efficient use of electricity are being considered in many states and have been adopted in some. Such rate structure reform should be accelerated so that unnecessary powerplant construction and the resulting misallocation of scarce capital can be minimized.

The market has still other imperfections. It does not adequately address the "non-economic" needs of our country. For example, the market does not take into account our national security needs. Fifteen percent of our oil today is imported from the unstable Middle East, more than was imported during the Arab Oil Embargo.[62] Relying solely on the market will not reduce our dependence on that region quickly enough. Nor does the marketplace presently provide for environmental quality or public safety. It does not take into account the risks of altering the climate from burning fossil fuels or the threat of weapons proliferation from nuclear power.

Finally, the Administration's laissez-faire attitude toward conservation simply ignores the plight of low-income families that lack credit or capital. These Americans are falling farther and farther behind despite heroic, and sometimes dangerous, attempts to use less energy.[63] Energy expenditures in the United States have topped $400 billion a year. Millions of households now find that they must set aside 20 to 30 percent of their monthly income to pay for energy. And in some months that percentage approaches 100 percent for households on fixed or declining incomes. Yet, the Administration has proposed ending all funding for the Low-Income Weatherization Program, a program designed to provide permanent relief to 12 million low-income families by weatherizing their homes. The market will not provide for these families.

Energy Subsidies

The ultimate hypocrisy of the Reagan Administration's free market rhetoric is that this Administration is as guilty as its predecessors of distorting the market through government subsidies. These subsidies flow to the production of conventional sources of energy, artificially lowering costs and encouraging the use of fuels rather than investments in efficiency improvements or in renewable energy. Estimates of these government subsidies range from $10 billion to $16 billion annually.[64] In contrast, federal conservation subsidies--most of which the Reagan Administration would like to eliminate--amount to only $1 billion to $2 billion annually.[65]

Production subsidies take many forms. The nuclear industry receives subsidies for research and development, foreign reactor sales, the exploration, production, and enrichment of uranium, radioactive waste management, the development of the breeder reactor and commercial reprocessing, and insurance against nuclear accidents. And the fossil fuels industry receives subsidies for synthetic fuels development, oil and gas exploration and drilling, foreign oil production, and oil depletion.[66] Were these subsidies eliminated, conservation would be better able to compete in the marketplace with energy production.

The Reagan Administration has made no attempt to eliminate these subsidies, moving instead to further distort the market.[67] For example, the electric utility industry has come in for special help from the Administration. The 1981 tax cuts included an incentive to induce investment in the stocks of certain utilities. Investors in these companies will be able to receive up to $750 in tax-free dividends. Ironically, some utilities have indicated that the new law will not help them much because these utilities pay almost no federal taxes. (This problem, however, is also addressed in the tax bill, which allows the sale of unusable tax credits.)

Another tax concession, this one initiated by the Federal Energy Regulatory Commission (FERC), assures that utilities can keep those tax breaks associated with the sale of wholesale power, rather than sharing them with customers. Still another pending proposal, strongly endorsed by the Reagan-appointed FERC Chairman, would allow utilities much greater latitude in obtaining a return on investments in power plants that are still under construction. FERC has also proposed substantially reducing reporting requirements so that utilities will have to supply less of the cost information that is crucial in the scrutiny of rate requests. The Department of Energy's national electricity policy project is expected to develop still other special privileges for the utility industry.

One of the few energy tax subsidies the Administration has proposed eliminating is--true to form--for conservation, the business energy credit.

Solar Eclipse

Two nation-wide polls conducted during the Presidential campaign--one by Gallup, the other by Roper and Cantril--revealed that more Americans want to see renewable energy used to meet U.S. energy demand than any other option.[68] This popular support should come as no surprise. Used wisely, power from the sun, wind, falling water and plants is gentle to the environment. Its use presents few of the economic and safety risks posed by the fossil and nuclear alternatives.

The Rawest Deal

Although President Reagan has claimed that solar energy is "exotic" and that solar technologies are "not viable alternatives to oil, coal, and nuclear power," the evidence to the contrary is overwhelming. According to A New Prosperity (a Solar Energy Research Institute report that the Administration tried to suppress), 20 to 30 percent of U.S. energy demand in the year 2000 could be met by renewable resources, assuming the country follows an energy-efficient path.[69] (Renewable resources, mostly wood and hydropower, now meet about 6 percent of U.S. energy needs.) Such a future would not be one of deprivation. Indeed, the SERI analysts assumed an increase of 45 percent in per capita income and a real 80 percent increase in GNP over the remainder of the century.[70] Similar conclusions were reached by the Harvard Business School's Energy Project.

The facts the Reagan Administration denies add up to a strong case for increased support for solar energy technology development. Yet, three months after he was elected, President Reagan called for a 69 percent reduction, from $576 million to $193 million, in the solar budget.[71] Six months later, he proposed a solar budget of $73 million for 1983--about 92 cents per American home, each of which spends an average of about $750 on household energy purchases each year.[72] (As part of these cuts the Administration has fired 300 of the 800 employees of the Solar Energy Research Institute, the nation's only national laboratory focused on conservation and renewable energy resources.)

The Administration justified the solar budget cuts on grounds that government energy subsidies should be eliminated and that the solar tax credits now in effect provide sufficient incentives. But the White House's subsequent actions proved the hypocrisy of the energy plan. For while the Administration wants to slash solar energy funding, it proposed a 36 percent increase in the fiscal 1982 nuclear budget, and accepted $12 billion of additional tax benefits for oil companies. Moreover, after the energy budget was approved by Congress (which added over $100 million to the President's solar request), the Administration then targeted the solar tax credits for repeal. The attempt was stymied by a joint resolution of the House and Senate. But the latest Reagan budget again targets the solar business energy credits for repeal, while maintaining such incentives for the oil industry as the special depletion allowance and deductions for "intangible" drilling expenses, incentives that are projected to cost the U.S. Treasury $6.4 billion in fiscal year 1983.[73]

Besides attacking solar programs and tax credits, the Administration has sought to undermine some of the federal laws and regulations that currently affect solar technologies. As mentioned, Congress rejected the Administration's effort to destroy the Residential Conservation Service Program, which requires utilities to provide energy audits for customers. But despite support for RCS in Congress, the Administration has proposed radically changing the RCS regulations so that in virtually no instances will auditors be able to suggest solar applications.[74] The White House has also supported legislation to "deregulate" small hydropower projects at most potential sites, creating environmental, water, and land management problems even as FERC is being deluged with applications for project permits. Although the prospects for this legislation are not bright, the Administration has already weakened FERC environmental safeguards by drastically reducing the staff that does the basic river basin planning needed in hydropower licensing.

The White House has also supported legislation to weaken the Public Utility Regulatory Policies Act, part of which requires utilities to purchase excess electricity from small power producers and cogenerators.[75] The law addresses the major problem that private entrepreneurs of small-scale hydroelectric dams, wind energy systems, and cogenerators face--integrating with utility grids. Weakening the law could allow the utilities to maintain a monopoly on power production and discourage the development of decentralized energy sources. The Congress has so far rejected the Administration's efforts.

Besides enhancing national security by reducing oil imports, a broad-based program of federal support for renewable resources provides a firm hedge against inflation. Once installed, solar systems require no fuels, the rising costs of which today contribute heavily to inflation. Renewable resources also pose far fewer environmental hazards than coal and nuclear power (particularly climate changes induced by the atmospheric buildup of carbon dioxide resulting from the burning of fossil fuels)[76] and threats to world peace from international commerce in plutonium. Difficult to quantify, these benefits--like those of conservation--are assigned no value in the present market structure despite their obvious importance.

What's Needed

The type of federal assistance needed by renewable resources varies from technology to technology. In most cases, federal tax credits are needed to compensate for the subsidies to conventional fuels and to stimulate production and sales that will help drive down costs. These credits, which the Reagan Administration has threatened to abolish, also help compensate for the relatively high up-front costs of purchasing solar equipment. For consumers unable to purchase renewable energy systems for their homes (solar collectors, wind turbines, photovoltaic cells, and the like) or unable to use tax credits, Congress established the Energy Conservation and Solar Energy Bank in 1980 to provide low-interest loans to low- and moderate-income people. This institution has also come under attack from the Administration, which has fired the Bank's staff, withheld implementing regulations, proposed rescinding funds, and refused to start up the Bank despite clear direction from Congress to proceed.

Besides financing assistance, solar information for energy users is needed. Especially hard-pressed for information is the building sector, which tends to be fragmented and slow to innovate. Programs to accelerate the flow of accurate solar information to homeowners, developers, and the owners of commercial buildings can remove one of the major barriers to effective consumer action--the lack of credible information on what works and what doesn't. Providing such information costs relatively little and can measurably improve the operation of market forces. Yet, the Administration is reducing the distribution of such materials.

Finally, for some solar technologies, other types of support may be warranted. In the case of photovoltaics, a rapidly developing technology that converts sunlight directly into electricity, the compelling need is to bring down system costs. If, according to a joint report by the Solar Lobby and the Solar Energy Industries Association, the U.S. photovoltaics program's momentum can be sustained, the equivalent of 330,000 barrels of oil a day can be displaced within two decades by using photovoltaic devices.[77] One effective way to bring down costs is through a federal purchasing program, which can provide the volume demand needed to justify mass production. Unfortunately, the Reagan Administration shows no interest such a program.

Supporters of renewable energy simply want the federal government to give emerging renewable technologies a fair shake, either by eliminating all subsidies to all energy sources or by providing a balanced energy program to all energy sources. Offering little more than free-enterprise rhetoric, the Administration is instead perpetuating lopsided and counterproductive subsidies to conventional fuel producers and passing over our best hope for new supplies of clean, safe, and reliable energy.

III. TOWARD A RATIONAL ENERCY POLICY

A rational U.S. energy policy requires realistic assessments of both our future energy needs and the energy sources available to meet them. A policy should strive for economic efficiency, meeting the nation's requirements for energy services--lighting, warmth, mobility, and so forth--as cost-effectively as possible, while taking into account the economic and other risks and advantages posed by alternative energy technologies.

A national energy policy should also complement the achievement of such national goals as enhancing national security, sustaining economic growth, safeguarding environmental quality, and increasing employment. And it should ensure that low-income Americans can meet their basic energy needs.

Such a policy can be designed. Indeed, its essential elements have been described in numerous studies since the word "energy" became linked with "crisis." Summarized here, they stand as an alternative to the piecemeal and counterproductive proposals that the Reagan Administration has advanced during the past 14 months.

Increasing National Energy Efficiency

Increasing national energy efficiency should be the highest immediate priority, rather than the lowest. As published studies document, cost-effective conservation technology now available can continue to substantially reduce our needs for oil, gas, and electricity for many years at "effective fuel costs" far below those of new and existing energy sources.

In addition to being cost-effective, conservation improvements enhance national security enormously. Indeed, between 1977 and 1981, conservation improvements led to a 33 percent reduction in oil imports.[78] What's more, these improvements have come about far more quickly and inexpensively and with far fewer environmental impacts than would be possible with any program based on synthetic fuels or nuclear energy.

Focusing our national investment policy on making our industrial processes and consumer products more energy efficient will keep U.S. businesses more competitive with foreign producers and increase domestic employment. Fewer jobs will be lost to foreign competition if American producers develop more energy-efficient cars, refrigerators, and other consumer goods. As it is, many traditionally strong American industries can no longer endure the flood of more energy-efficient products manufactured abroad. As a result, more and more American workers go jobless. And dollar for dollar, conservation investments create many more jobs than the construction and operation of highly capital-intensive electric power plants or synthetic fuels plants.

Improving national energy efficiency requires broad federal support. As described in Section II, numerous market imperfections and barriers inhibit the more efficient use of energy in this country. Unless these problems are overcome, the economy will continue to consume far more energy than is economically needed and Americans will pay the price for doing so through higher energy bills, higher rates of inflation and unemployment, reduced national security, and needless environmental degradation. Unfortunately, many of the programs needed to help the economy become more energy efficient are precisely those the Reagan Administration is eliminating.

Consumers cannot make economically justified energy investments if they do not have accurate information on the costs and benefits of investment alternatives. The Environmental Protection Agency's fuel-efficiency labeling program for cars and trucks exemplifies initiatives that can improve the market's workings by providing consumers with information on the relative efficiency of competing models. So too, appliance-labeling and building-labeling for energy performance deserve federal government's support, not opposition. Providing technical assistance for residential energy consumers through regulated utility involvement in the Residential Conservation Service program is another example of an information program that the country badly needs and that the Administration is drastically weakening. Providing consumers with accurate information fulfills a vital national need that the private sector cannot meet alone.

Federal efforts are also needed to overcome problems related to obtaining financing for conservation as well as for renewable energy measures. Many consumers simply do not have the capital to retrofit their homes, so they are stuck indefinitely with unnecessarily high energy bills. The same problem plagues many small commercial and industrial firms that don't have adequate cash flows to obtain loans or that find interest rates prohibitively high. But these problems are not intractable. Some electric utilities now have low- or no-interest loan programs for conservation and solar investments. These programs help consumers by providing the capital to reduce their energy bills and help utilities by cutting the need to build new generating capacity. Federal support of such programs is needed to eliminate the barriers to their widespread adoption. The federal Solar Energy and Energy Conservation Bank established by Congress would also address this problem by making low-interest loans available to low- and moderate-income households and small businesses. The bank deserves support. Instead, it is being eliminated.

Still other barriers that discourage cost-effective investments in energy efficiency need to be removed. Rented commercial and residential buildings face many barriers that inhibit cost-justified conservation and solar investments. The landlord-tenant problem, building codes, master-metering, some rent control laws, and old long-term leases that make it difficult to retrofit buildings are some of the entrenched barriers that need to be analyzed. If the federal government does not support analysis in these areas, it is unlikely to be carried out at all, and the nation's energy consumers will pay the price.

Federally supported research on conservation technology and related issues (such as the indoor air-quality problems arising from some conservation measures) is another important element of a federal energy policy. For reasons explained in Section II, private funding for both basic and applied conservation research is inadequate. Policy analysis, building design and operation, transportation system design, fundamental research to improve industrial processes and materials, and the prototype development and demonstration of new energy conservation technologies all warrant support.

The Administration has virtually eliminated funding for energy conservation research on grounds that industry will develop whatever the nation needs. But the interests of the marketplace and those of the nation cannot simply be equated. Industry operates within a relatively short time horizon and has as its goal the development of salable products that may or may not be important to national survival. The nation must necessarily take a longer perspective. Promoting global peace, supporting national economic growth, protecting the climate and our other natural resources, increasing national employment, and protecting those least able to help themselves--these important issues weigh significantly in the development of national policy but not in private decision-making. Even if the private sector can afford to ignore these factors in its research decisions, the federal government cannot.

Energy pricing remains perhaps the key to more efficient energy use. Indeed, the removal of price controls and the revision of state gas and electric rate structures to more accurately reflect the changing costs of new energy supplies is a policy that many environmental and public interest groups would support _if_ low- and middle-income Americans could be protected from unbearable price increases. If energy is priced significantly below its replacement value, consumers will tend to overuse fuels and underinvest in conservation measures that are not price-regulated.

The Reagan Administration's neglect of the needs of economically strapped Americans makes any form of additional price decontrol unacceptable at this time. By severely cutting the low-income weatherization program and dismantling the Solar Energy and Energy Conservation Bank, this Administration has made it clear it will not take even the smallest steps to protect those hit hardest by rising energy costs--the elderly, the recipients of public assistance, the working poor, and lower- and middle-income families who are already suffering the loss of food stamps, job training programs, college loans, and other programs designed to meet basic needs. However theoretically sound price decontrol and replacement cost pricing may be as long-term energy policies, adopting them now could intensify the harmful effects of program cuts on those individuals and geographic regions that are already bearing the brunt.

Other factors distort energy prices. Extraordinary tax breaks, development and commercialization funding, utilities' freedom from full financial responsibility for nuclear accidents, and the so-called "social costs" of failing to make dirty fuels environmentally acceptable--all of these subsidies encourage energy consumption and devalue energy efficiency in supplying basic energy services. All ought to be removed.

Laying the Foundations for a Solar Economy

Even as the economy grows more efficient, new energy sources will eventually be needed to replace dwindling domestic oil and gas supplies and to reduce the levels of imported oil. Fortunately, the United States has such resources. It is richly endowed with vast fossil, nuclear, and solar resources. In principle, any one of these three sources could ultimately meet most of our energy needs. Yet, each of these sources poses vastly different challenges and problems that must be taken into account in national energy planning. Their market prices alone do not reveal the long-range benefits and risks of each, and overwhelming scientific and political uncertainties make it impossible to fully translate risks into economic costs.

Increasing reliance on fossil or nuclear fuels has long-term climate, safety, and security ramifications that deserve close attention in the formulation of national policy. Coal constitutes about 90 percent of our remaining fossil fuels. If electric utilities and industry, its primary users, were to increase coal use substantially either by generating more electricity or producing synthetic oil and gas, serious environmental and social impacts would occur. The consequences would range from the industrial development of our western states--where most of our easily accessible coal resources are--to the enhanced build-up of carbon dioxide in the atmosphere.

The carbon dioxide problem poses long-term and essentially irreversible risks to the global climate.[79] Within a mattter of fifty years or so, continued fossil fuel burning could lead to an increase in the average global temperature of 3° C, resulting in changed patterns of rainfall and snow and ice cover, and eventually to a rise in sea levels if the West Antarctic ice sheet should disintegrate. World agriculture could be seriously disrupted and a significant rise in the oceans would flood many coastal cities around the world.

Prudence dictates, then, that coal burning be constrained so as to avoid increasing the risks of climate change. For this and other reasons, it would be a costly mistake to develop synthetic oil and gas from coal (or oil shale) on a wide scale. Doing so would commit us to enormous, long-term investments in synfuel plants and associated fuel-burning facilities--ranging from our petroleum-powered transportation system to the oil- and gas-heating systems of our buildings. These facilities could not possibly be replaced quickly enough to stop climate changes once they have begun. If the carbon dioxide problem is taken seriously, coal should be viewed only as a transitional fuel, one to be used sparingly as we reduce our dependence on carbon-based energy sources.

Each of the nation's other two long-range energy options--nuclear energy and renewable sources--could relieve us of the risks of climate changes, though in vastly different ways and at very different costs. (Nuclear fusion has yet to demonstrated technically feasible and is not considered here as an available energy option.)

The problems posed by nuclear fission--high costs, unsolved safety problems, plutonium proliferation, and radioactive waste management--have been sketched in Section II of this report. The Reagan energy program does little to deal constructively with these issues. A rational nuclear policy would seek to improve the safety and fuel efficiency of existing nuclear plants, solve the waste problem in a responsible manner, limit global commerce in plutonium, and forestall the introduction of breeder reactors until the danger of weapons proliferation they pose has been eliminated.

Whatever the source of the failure, the future of nuclear power is bleak indeed, and its gradual phasing out appears likely. Counting on fission as an important element of future energy supply would clearly be a mistake.

Renewable resources, our remaining option, are represented by many different technologies. These include solar collectors and passive building designs that can provide space heating, hot water, and steam for industry; solar cells, wind turbines, and hydro dams that generate electricity; and biofuels, such as wood and wastes.

Renewable energy sources pose neither the climate risks nor the security and safety hazards of fossil and nuclear sources. And using solar energy technologies entails far fewer environmental risks than conventional energy sources. Moreover, to the extent that their use reduces oil imports, they can help stabilize oil prices, improve the country's balance of payments, and enhance national security.

Renewable energy systems can provide stability and flexibility to the nation's energy supply and can be better matched to the end-uses for which energy is needed, thus reducing the nation's overall energy waste. (Almost half of the energy consumed in the United States is now directly wasted in energy conversion, transmission, or end-use losses.) Then too, renewable technologies are modular, so they can be brought into operation far more quickly than can large power plants or synthetic fuel plants.

Many renewable technologies are already cost-effective and are being used increasingly in a wide range of applications. Wood burning, the combustion of used paper and other solid wastes, low-head hydro dams, solar water-heating systems, passively designed buildings, and wind energy systems are all helping to meet an ever greater share of the nations's needs. Other solar technologies--most notably, photovoltaics--are developing rapidly and promise to be cost-effective in many settings by 1990.

Several major energy studies have concluded that by the turn of the century renewable energy sources could be meeting 20 to 30 percent of U.S. energy needs. Reaching this level, however, would require a concerted national effort aimed at improving the efficiency with which we perform tasks and use resources. It would also require an aggressvie program of introducing renewable energy sources. Such an effort can be realized only if the federal government acknowledges that conservation and solar technologies are viable alternatives to fossil and nuclear sources.

More specifically, the government must support research on technology development as well as systems integration. Because solar energy is intermittent, energy storage deserves special attention. An industrial economy powered by renewable resources will run largely from storage. Storage technologies are the key to making use of electricity from solar cells and wind turbines round the calendar and round the clock. Our transportation system—now powered almost entirely by liquid fossil fuels--poses a particulary difficult storage challenge. Hydrogen, derived from solar sources, and electric batteries both offer promising means for storing solar energy to power the vehicles of the future. If renewable resources are to meet a growing fraction of our energy needs, a major effort will be needed to develop and perfect low-cost, reliable storage technology.

There are other needs that the government is uniquely able to fulfill: providing consumers with reliable information on solar applications, making capital more accessible to those wishing to install solar systems, identifying and removing institutional barriers to the use of solar technologies, and confronting the problems of market distortion posed by energy subsidies.

* * *

The Administration and the Congress must recognize that the nation's energy future is not just a matter of chance, determined by uncontrollable market forces or unpredictable resource shortages. We are, in truth, masters of our own energy destiny. If we wish to make our economy more efficient and more reliant on renewable energy sources, the choice is ours. There are no physical, technical, or institutional barriers that we cannot overcome. What is needed most is a recognition by our national leaders that the important choices before us cannot be blindly left to the market place, and that by planning wisely we can safeguard the national interest while meeting our energy needs. We can create a safer and saner alternative than the radical, costly, dangerous, and inconsistent energy policy the Reagan Administration has proposed.

REFERENCES

1. Data from February 1982 News Release "Summary of Reagan FY 1983 Energy Budget Request" Subcommittee on Energy Conservation and Power, Committee on Energy and Commerce, U.S. House of Representatives, and personal communication, Andy Glassberg of the Subcommittee Staff, February 25, 1982.

2. "November National Poll," November 24, 1981, conducted by NBC News and The Associated Press, page 11.

3. "Nuclear Energy and the Public Under the Reagan Administration: Prospects for Ending the Stalemate," Eugene A. Rosa, *et al.*, presented at the Annual Meeting of the American Association for the Advancement of Science, Washington, D.C., January 4, 1982, pages 12-13.

4. The economic problems being experienced by nuclear power plants are described in *Power Plant Cost Escalation*, Komanoff Energy Associates, New York, 1981, by Charles Komanoff; "Nuclear Fizzle?" by Michael Brody, *Barrons's*, August 24, 1981; "A Nuclear Fiasco Shakes the Bond Market," by Peter Bernstein, *Fortune*, February 22, 1982. Some of the generic technical problems related to steam generators and embrittlement at nuclear plants have been described in the *New York Times*: "Rusting Found In Key Section of 17 Reactors," 9/21/81; "Steel Turned Brittle by Radiation Called a Peril at 13 Nuclear Plants," 9/27/81; and "Nuclear Power's New Dilemma," October 4, 1981.

5. "The Impacts of Synthetic Fuels Development," David C. Masselli and Norman L. Dean, Jr., September, 1981, National Wildlife Federation.

6. The 1983 budget proposed for EPA represents a 39 percent reduction from 1981 while the agency's work load has essentially doubled.

7. See footnote 5. Also, "Synthetic Fuels and the Environment: An Environmental and Regulatory Impacts Analysis." June 1980, DOE/EV-0087.

8. Statement by the President, Office of the Press Secretary, The White House, October 8, 1981.

9. February 1982 News Release "Summary of Reagan FY 1983 Energy Budget Request" Subcommittee on Energy Conservation and Power, Committee on Energy and Commerce, U.S. House of Representatives.

10. Sixty-eight nuclear plants were cancelled between 1973 and 1980, see "Nuclear Fizzle?", footnote 4, *supra*. Thirteen additional plants have since been cancelled, see footnote 11.

11. Since the summer of 1981 the following 13 nuclear plants have been cancelled: Bailly, Callaway 2, Shearon Harris 3 and 4, Hope Creek 2, Pilgrim 2, Perkins 1, 2, and 3, Washington Public Power Supply System 3 and 4, and Black Fox 1 and 2.

12. The ads were summarized by NRC Commissiner Victor Gilinsky thus: "...this ad suggests that 33 plants can be made ready to operate in the next two years if only the regulators will stop dragging their feet. I've examined

those projects. On the basis of our experience with nuclear construction schedules, I would guess that no more than 20 of the 33 will actually be completed by then. I'm talking about construction delays and not licensing delays." Remarks of Victor Gilinsky, November 5, 1981 to the American Nuclear Society.

13. Letter from Nunzio J. Palladino, Chairman, U.S. Nuclear Regulatory Commission, to Rep. Tom Bevill, January 29, 1982, "NRC Monthly Status Report to Congress," pages 4, 5 and Table 1.

14. Remarks of Victor Gilinsky before the World Nuclear Fuel Market's International Conference on Nuclear Energy, October 27, 1981.

15. Remarks of Nunzio J. Palladino to Atomic Industrial Forum Annual Conference 1981, December 1, 1981.

16. "Analysis of Nuclear Power Economics," R. W. Hardie and G. R. Thayer, Los Alamos Scientific Laboratory, LA-8899-MS, June 1981, page 16.

17. "Barnwell Nuclear Fuel Plant to be Closed," Chemical and Engineering News, October 26, 1981, page 8.

18. "Weapons Builders Eye Civilian Reactor Fuel," Science 214, October 16, 1981, page 307.

19. Natural Resources Defense Council Press Release, "NRDC Challenges DOE Program to Use Commercial Nuclear Reactor Fuel to Make Atomic Bombs," July 24, 1981.

20. "Effort o Convert Reactor Waste to Military Use Arouses Alarm," New York Times, September 22, 1981.

21. Ibid.

22. See, e.g., "Proliferating Doubt" Wall St. Journal, Feb. 4, 1982; "Nuclear Cheating: Why the Experts Are Worried Over Safeguards," New York Times, December 22, 1981.

23. DOE Draft Supplemental Environmental Impact Statement, on the LMFBR Program, January, 1982.

24. Proposed Budget for the United States, Fiscal Year 1983.

25. Telegram from Edward Teller to U.S. Representative Claudine Schneider, May 11, 1981.

26. "Analysis of Nuclear Power Economics," R. W. Hardie and G. R. Thayer, Los Alamos Scientific Laboratory, LA-8899-MS, June 1981, page 18.

27. "Uranium, Electricity and Economics," Testimony before the Subcommittee on Energy Conservation and Power, of the House Committee on Energy and Commerce, Frank von Hippel, October 5, 1981, page 10.

28. "Atomic Apprenticeship," Editorial, Wall Street Journal, August 20, 1981.

29. "The Market Case Against the Clinch River Breeder Reactor," Rep. David Stockman, September 17, 1977.

30. Federal Energy R&D Priorities, R&D Panel of the Energy Research Advisory Board, November, 1981, page 27.

31. "Uranium, Electricity and Economics," Testimony before the Subcommittee on Energy Conservation and Power, of the House Committee on Energy and Commerce, Frank von Hippel, October 5, 1981, page 6.

32. Update, Nuclear Power Program Information and Data, October/December 1981, Office of Nuclear Reactor Programs, U.S. Department of Energy, page 95.

33. See, e.g., Komanoff, from footnote 4.

34. Statement of Theodore B. Taylor to Subcommittee on Oversight and Investigtions, Committee on Interior and Insular Affairs, October 23, 1981.

35. Ibid.

36. See, e.g. "Letting Nuclear Danger Spread," Jessica Tuchman Matthews, Washigton Post, December 2, 1981.

37. "Securing America's Energy Future, The National Energy Policy Plan," U.S. Department of Energy, July 1981, page 10.

38. Statement by the President, Office of the Press Secretary, The White House, October 8, 1981.

39. "Geologic Disposal of High-Level Radioactive Wastes--Earth-Science Perspectives," Geological Survey Circular 779, J.D. Bredehoeft, et al., 1978, page 12.

40. "Report to the President by the Interagency Review Group on Nuclear Waste Management," U.S. Department of Energy, TID-29442, March 1979, page 3.

41. The Lyons, Kansas debacle is described in The Atomic Establishment by H. Peter Metzger, (New York: Simon and Schuster, 1972), in Radidoactive Waste, by Ronnie D. Lipschutz, (Cambridge: Ballinger Publishing Co., 1980), and in "Radioactive Ashes in the Kansas Salt Cellar," John Lear, Saturday Review, February 19, 1972.

42. "Public Information Plan," U.S. Department of Energy Memorandum, September 24, 1981, from Eric. E. Anschutz to Shelby T. Brewer, Assistant Secretary for Nuclear Energy.

43. See footnote 2, supra, page 11.

44. See footnote 3, supra, page 19.

45. Ibid, page 10.

46. A clear, easily readable discussion of the Price Anderson Act and its effects on both the public andd the nuclear power industry can be found in

the booklet "Nuclear Insurance, Unavailable At Any Price," by Keiki Kehoe, 1980, The Environmental Policy Center, 317 Pennsylvania Ave., S.E., Washington, D.C. 20003, $2 postpaid.

47. In Fiscal Year 1981, prior to the first round of rescissions and deferrals requested by President Reagan, the federal energy conservation budget stood at $802 million at DOE (excluding Energy Impact Assistance) and $123 million at HUD (for the Solar Energy and Energy Conservation Bank.) See, e.g. Secretary's Annual Report to Congress, Vol. II, USDOE, January 1981.

48. Business Responses on Regulatory Burdens, An Initial Report Submitted to the Task Force on Regulatory Relief by the Department of Commerce, June, 1981, page 10.

49. House Resolution 243; Senate Resolution 232. Ninety-Seventh Congress.

50. See, e.g., Solar Energy Research Institute, A New Prosperity: Building a Sustainable Future, (Andover Mass.: Brick House Publishing, 1981) hereafter referred to as the "SERI Report"; John H. Gibbons and William U. Chandler, Energy--The Conservation Revolution (New York: Plenum Press, 1981); Marc H. Ross and Robert H. Williams, Our Energy: Regaining Control (New York: McGraw-Hill, 1981); Henry W. Kendall and Steven Nadis, Eds., Energy Strategies: Toward A Solar Future, (Cambridge, Mass.: Ballinger, 1980); The National Audubon Society, The Audubon Energy Plan, April, 1981; Hans H. Landsberg, Chairman, et al., Energy: The Next Twenty Years, Report by a study group sponsored by the Ford Foundation and administered by Resources for the Future (Cambridge, Mass.: Ballinger Publishing Company, 1979); National Research Council, Energy in Transition: 1985-2010, Final Report of the Committee on Nuclear and Alternative Energy Systems, Nsational Academy of Sciences (San Francisco: W.H. Freeman and Co., 1979); Robert Stobaugh and Daniel Yergin, Eds., Energy Future, Report of the Energy Project at the Harvard Business School (New York: Random House, 1979); Roger Sant et al., The Least Cost Energy Strategy, The Energy Productivity Center, Mellon Institutue (Pittsburgh: Carnegie-Mellon University Press, 1979); Domestic Policy Review Panel, The Domestic Policy Review of Solar Energy, A Response Memorandum to the President of the United States (U.S. Department of Energy, February 1979) TID-22834.

51. See, e.g. SERI Report, footnote 44, Table 2.2.

52. Ibid, Table 1.

53. U.S. Department of Energy, Monthly Energy Review, January, 1982, page 14.

54. Ibid.

55. Energy Conservation: The Road to New Growth in an Era of Uncertain Supply, A Report of the Energy Conservation Coalition, October 20, 1981, Table 4C, page 5.

56. See, e.g., Reducing U.S. Oil Vulnerability, U.S. Department of Energy, November 10, 1980, page 23: "At today's energy prices, economically justifiable retrofits to improve the energy efficiency of American homes would cost about $100 billion."

57. Office of Management and Budget, Fiscal Year 1981, Special Analysis G, page 226.

58. National Energy Conservation Policy Act (NECPA), Public Law 95-619, Title II, Part I.

59. Energy Policy and Conservation Act, Public Law 94-163, Title III, Part B.

60. Eric Hirst, "Improving Energy Efficiency: The Case for Government Action," ORNL, March 1981.

61. The energy conservation budget for research and development proposed for fiscal year 1983 is only $17.5 million. This compares to $182 million in fiscal year 1982 and $290 million in fiscal year 1981 (prior to rescissions.)

62. U.S. Department of Energy, Monthly Energy Review, January 1982, page 34.

63. See, e.g., *Low-Income Energy Assistance: A Profile of Need and Policy Options*, U.S. Department of Energy Fuel Oil Marketing Advisory Committee, July, 1980; *Poor Plus Old Equals Cold*, Grier Partnership, April, 1981.

64. According to OMB estimates contained in the Fiscal Year 1982 Budget, tax expenditures plus outlays for energy supply totaled $15 billion, while for fiscal year 1981, they totaled only $1.5 billion for energy conservation. See Special Analysis G, Table G-3.

65. *Ibid*.

66. Congressional Budget Office Report, September, 1981, "Tax Expenditures: Current Issues and Five Year Budget Projections for Fiscal Years 1982-1986."

67. The Economic Recovery Tax Act of 1981 included three new tax breaks for oil and gas concerns: a $2500 royalty credit for 1981, with a total exemption for 1982 and thereafter; a reduction in the tax on newly discovered oil; and an exemption from the windfall profit tax for independent-producer stripper-well oil. These three modifications alone will cost the federal treasury over $11 billion in lost revenues from 1982 to 1986, according to estimates of the Joint Committee on Taxation of the U.S. Congress, August 5, 1981.

68. These two polls are summarized in "The National Study of the Residential Solar Consumer: Decision Factors and Experiences--Preliminary Summary Report," Barbara Farhar Pilgrim *et al*., Solar Energy Research Institute, May, 1981.

69. SERI Report, see footnote 44, page 1.

70. *Ibid*.

71. Department of Energy, FY 1982 Congressional Budget Request, March 1981.

72. *Statistical Abstract of the United States, 1980*, Table 1615, page 937. The total number of occupied housing units is estimated to be 79 million.

73. Special Analysis G Basis, Office of Tax Analysis, Office of the Secretary of the Treasury, U.S. Treasury Department.

74. The proposed rules amending 10 CFR 456.315 appear in Federal Register 46 No. 218, Thursday, November 12, 1981.

75. Broyhill amendment to Omnibus Budget Reconciliation Act of 1981, June, 1981.

76. "Global Energy Futures and the Carbon Dioxide Problem," Council on Environmental Quality, January, 1981.

77. "Meeting the Challenge of the Times: An Austere Renewable Energy Budget," Solar Lobby, Solar Energy Industries Association, May, 1981, page 10.

78. U.S. Department of Energy, Monthly Energy Review, January 1982, page 14.

79. See, e.g., Footnote 76.

Senator PERCY. Senator Hatfield, two things that you said I would like to briefly comment on, the impoundment and the teamwork.

When I served on the Appropriations Committee I was struck by the fact that the Appropriations Committee as we set those budgets could be undercut right and left by the administration by just not spending the funds. They were then taking over what I thought was the responsibility of the Congress. Sam Ervin, Ed Muskie, and I worked for several years on the Impoundment Act to make it illegal for the administration to defy the Appropriations Committee, and I thought we had resolved it.

I am shocked we found a way to get around that act. I can pledge to you in the Governmental Affairs Committee we will work to tighten that act in any way we can if they have found ways to undercut it.

From the standpoint of teamwork, Senator Humphrey and I walked in and talked to Secretary Schlesinger as he was about to set up the Department of Energy that our committee had created. He was the first Secretary, and he heard about the Alliance to Save Energy. He said that is the first thing I have had and heard about that would make me believe I might be able, I might be able to do my job.

He sat in many of our Board meetings. He sat there while we deliberated for 3 hours, should we come out for decontrol of oil. All the evidence pointed that if we decontrolled oil, we would be able to keep prices stable, but emphasize conservation. That is exactly what has happened, and he and Stu Eisenstadt said they never would have had the courage to go ahead and do it unless they saw the broad front of support—27 votes for it, 3 votes against it if I remember the vote on the Board, and so that this emphasis on working together in teamwork is there. We reached out to work as a team with the Department of Energy.

There has just been no acceptance from their standpoint that I can see. I still say we are here. We don't know how long this process is going to last. We want to work with the Department of Energy, with the administration, in every way we can.

I will have a moratorium and cease-fire as of now if they want it, but I think they ought to know I am saying publicly what I have said in private, and in our sessions before, and I will continue to say it unless we get a little more cooperation and a little more give and take here.

Senator **Hatfield**. They are taking salaries under false pretenses when they call themselves conversationists. Maybe we ought to ask them to serve without salary.

Senator **Percy**. If I knew then what I know now, Mr. Tribble never would have been confirmed by our committee.

Thank you, sir.

Senator **Weicker**. Senator Percy, thank you very much. Senator Hatfield, thank you very much.

Mr. Tribble, you are left to the tender mercies of the powder puff compared to my colleagues here, Senator Percy and Senator Hatfield, so why don't you come up to bat and we will get into this matter.

Why don't you introduce your associates that have come with you? Your statement in its entirety will be put in the record at this point. You might care to go ahead and summarize it, and maybe you would like to respond to a rather tough indictment presented by two highly respected Members of the U.S. Senate.

Mr. **Tribble**. Of course I would like to introduce the gentlemen who are with me this morning.

On my left is Dr. Robert San Martin who is Deputy Assistant Secretary for Renewable Energy. On my immediate right is Mr. John Millhone who is the office director of the Building Energy Research and Development Office, and on his right, Dr. Melvin Chiogioji who is the Director of the Office of State and Local Programs.

I must say that, Senator, I am the principal villain. These other folks are real nice fellows. Don't hold them responsible for those things that you have heard me berated for.

STATEMENT OF JOSEPH J. TRIBBLE, ASSISTANT SECRETARY FOR CONSERVATION AND RENEWABLE ENERGY, DEPARTMENT OF ENERGY, ACCOMPANIED BY DR. MELVIN CHIOGIOJI, DIRECTOR, OFFICE OF STATE AND LOCAL ASSISTANCE; ROBERT SAN MARTIN, DEPUTY ASSISTANT SECRETARY FOR RENEWABLE ENERGY; AND JOHN MILLHONE, DIRECTOR, BUILDING ENERGY RESEARCH AND DEVELOPMENT

Mr. **Tribble**. There is another side to the question, and I will do my best this morning to demonstrate that there is another legitimate point of view for the proposals that we are making in the 1983 budget.

Just a very brief summary because as you have said, you would take the entire statement for the record, there are two prime factors which justify the tremendous reduction in the budget that we have proposed for 1983.

First, much of the money that this committee has authorized in the last few years has gone into expensive hardware. Many of these experiments have already served their purpose, and we should now divest ourselves of them. Others are in the data collecting stage, and it is our intent to gain all the information which is useful from these demonstrations and package that information in the form which will be useful to anyone who wants to use it.

Many of the renewable technologies have been advanced to the point where they can be implemented when it is economical to do so. The Government programs that have been going forward in the last few years in these technologies have made tremendous strides. We propose to discontinue the building of expensive hardware for demonstration purposes and to concentrate our activity on research.

Second, there is virtually no linkage between the size of the budget for conservation programs and the amount of conservation taking place. The recent study by the Oak Ridge National Laboratory to which Senator Percy referred does show that all energy conservation on a per unit basis which has taken place since 1972, 95 percent has been because of the increase in cost of energy. While the remaining 5 percent was attributed to Federal Government programs, it was not directly linked to the amount of money spent on research.

The buildings and industrial equipment placed in service prior to 1973 were energy inefficient not because we did not know how to build them to consume minimum amounts of energy, but they were energy inefficient because energy was inexpensive. It was an economic matter. It seemingly didn't make sense to spend capital on energy conservation measures which would never pay back the investment.

We know how to build new buildings and equipment to be energy efficient, and we need to spend comparatively little on research of this nature. One other point, and that is that conservation and renewable energy, as I have said in other testimony, is like apple pie and motherhood. No one wants to be against those general umbrella terms.

On the other hand, when you look at specific technologies and specific items that are appropriate for the Government to do, we would like to be able to join with you and consider the technical merit of proposals so that the taxpayerss money can indeed be spent in a way that will yield real benefits.

We do not particularly think that it is appropriate if the Government spends money and the return on that to others is a high ROI. We think it would be more appropriate if the people who make the investment reap the return.

Mr. Chairman, that concludes my summary statement, and we will be pleased to respond to questions you have to the best of our ability.

[The prepared statement of Mr. Tribble follows:]

STATEMENT OF JOSEPH J. TRIBBLE

ASSISTANT SECRETARY

FOR

CONSERVATION AND RENEWABLE ENERGY

BEFORE THE

SENATE ENERGY AND NATURAL RESOURCES

COMMITTEE

ENERGY CONSERVATION AND SUPPLY SUBCOMMITTEE

MARCH 30, 1982

Mr. Chairman and Members of the Subcommittee:

I appreciate the opportunity to appear before you today to discuss the authorizations for the Department's conservation and renewable programs. The budget before you today reflects this Administration's commitment to the goals of the Economic Recovery Program, the need to minimize Government intervention in the marketplace, and the need to continue Federal support for research in areas where support is appropriate.

Following the oil embargo of 1973, and until 1980, the notion was widespread that the United States faced a problem which was quite different from those we had faced in the past. Some thought that our sources of energy were being exhausted. We were becoming more and more dependent upon oil imported from the Middle East. While prices charged for this oil were escalating rapidly, most of the prices for domestically produced oil and natural gas were controlled at very low levels. Relatively inexpensive energy, one of the basic building blocks of our economy, was becoming a thing of the past.

Many people felt that this was a problem that the Federal Government could and should resolve, and there were vocal demands for attempts to do so. In response, Congress enacted a legislative program which was designed to force energy conservation and subsidize rapid development of energy from renewable sources. Since the enactment of this legislation, billions of dollars have been spent on research, development, demonstration, and commercialization activities for the purpose of bringing into more widespread use energy from such sources as solar, geothermal, wind, biomass, ocean thermal and alcohol fuels. The technology for using these sources of energy has been advanced to the point where their further development and use can now be implemented by the private sector whenever they become economical.

Today the energy situation does not appear as intractable as it appeared when these legislative programs were enacted. Importation of petroleum into the United States is down approximately 50 percent from its previous high. The price for imported petroleum is below its high. The price of domestically produced petroleum was then decontrolled and the price of domestically produced natural gas has been permitted to rise many fold over the price at which it was controlled in 1972. Comparing 1972 to 1980, the energy efficiency of the ten most energy-intensive industries in the United States has improved by 17.6 percent. Comparing 1975 to 1981, the miles per gallon of fuel for new domestically-produced automobiles has improved by more than 60 percent. Residential energy consumption per household is down almost 20 percent in 1980 compared to 1972. In every case, the cost of energy has been responsible for the great majority of the improvement.

More remarkably, very little of this very great change in circumstances was predicted by those who urged creation of massive Federal Energy programs. In retrospect, we see that the total effect of all government action has been relatively minor. It is, therefore, entirely appropriate that the role of the Federal Government with respect to energy be re-evaluated.

Rather than continued emphasis on bringing renewable sources of energy into the marketplace through Federal Government subsidy, it is now more appropriate that the Federal program be limited to research of a more basic nature. If some of the remaining unknowns can be removed through research, the private sector will be able to hasten the day when energy from renewable sources will take a more prominent place in our economy.

Let me turn now to the specifics of the FY 1983 budget.

CONSERVATION

In the area of conservation, we will focus on expanding our scientific knowledge base by supporting generic high-risk, long-term research in selected technological areas. This new focus is reflected in the consolidation of our previous sector-oriented programs into a single Energy Conservation Research Program.

The basic objective of this program is to provide the technology base and technology options that the private sector can utilize in the development of more efficient energy conservation equipment and utilization processes. This program will solidify the technology base used by the private sector in designing the developing processes and equipment in their application to the transportation, buildings and industrial energy-use sectors.

The FY 1983 request for Energy Conservation Research is $17.5 million, which includes $1.7 million for program direction. This request will fund research activities in four research areas: heat transfer and fluid mechanics, materials and processes, thermochemical conversion, electrochemical storage and conversion. Activities in each element focus on research topics having high potential for improving energy use efficiency.

Heat Transfer and Fluid Mechanics

The request for heat transfer and fluid mechanics is $3.2 million, which will support technology base activities underlying the design of heat exchangers, and fundamental studies of heat loss in structures and industrial equipment. Research will also focus on generic properties of fluids and fluid systems that affect the efficiency of operation of power systems such as advanced heat engines and heat pumps.

In FY 1983, heat exchanger activities will build on earlier efforts that resulted in an integrated, computerized data base and model system for the prediction of flow-induced vibration. Research will focus on the modeling mechanism of flow-induced vibration in shell-and-tube heat exchangers caused by two-phase (steam/water) flow, and on innovative concepts such as suspended particle and direct contact heat exchanger concepts.

Heat transfer research activities directed at structures will focus on wall and roof systems, windows and daylighting, computer modeling enhancements and estimating methods.

Materials and Processes

The major thrust in materials research will be directed toward high temperature structural ceramics. While major advancements have been achieved in shape, fabrication and material strengths of structural ceramics, e.g., advanced gas turbine rotors have been cold spun to 126 percent and 134 percent of design speed with no failure, significant technological advances are needed in order for heat engines to operate more efficiently in severe environments.

Funding of $2.99 million will be directed at advanced materials development and processing, advanced net-shape materials fabrication, and new approaches to assuring structural integrity of advanced materials. Research would also be carried out on evaluation of critical properties of newly developed materials and determination of the interrelationship between newly developed processes, associated microstructure, and properties.

Several projects will be devoted to advanced materials development of: high-temperature ceramic/ceramic composites, ceramic matrix/metal fiber reinforced composites, a new family of transformation-toughened ceramics, and new thermal barrier materials. The goal is to develop composites that are low in cost and have low thermal expansion and conductivity coefficients. These materials will be able to withstand high temperatures, have moderate to high strength, and have high fracture toughness. Property evaluations will be made of friction and wear of ceramics and metals for high load environments. Newly developed ceramics will be subjected to screening tests, including thermal fatigue to examine their time-temperature-stress behavior. Promising candidate materials (fabricated in realistic shapes) will be tested in realistic environmental exposures.

Thermochemical Energy Conversion

The objectives of the thermochemical energy conservation are to develop accurate and reliable methods for industry use in designing components for more efficient internal combustion engines and methods for use in designing more efficient commercial and industrial furnaces. Advances have been made in addressing such technological barriers as our current incomplete understanding of engine and furnace combustion phenomena and lack of technology base.

FY 1983 funding of $2.37 million will support improved design and analysis capabilities for operation at reduced fuel-air ratios. Engine cycles to be included are direct-injection stratified charge (DISC) and dilute homogeneous charge (DHC).

In FY 1983, research on high-efficiency energy-conversion equipment/home heating equipment will continue to develop the fundamental understanding of thermodynamic properties, the kinetic properties, and materials/fabrications associated with the coupling of small heat engines to freon compressors systems. Planned milestones for FY 1982 will result in the development and testing of a dynamic coupling/seal for novel engine freon compressor systems. Successful coupling techniques could lead to industry's development of gas-fired, engine-driven residential heat pumps, capable of operating at double the efficiency of standard electric air/air heat pumps. Work will also be completed on the analysis of novel materials and material designs that could be utilized in the design of heat exchangers for use in residential-sized, condensing-mode heating systems. This work includes analyzing condensation composition of the waste gas stream of conventional heat exchangers.

Electrochemical Storage and Conversion

The objective of the electrochemical storage and conversion activities will be directed at the fundamental understanding of thermodynamics, kinetics, electrocatalysis, mass transport, and materials synthesis and fabrication as they relate to batteries and electrochemical processes and energy conversion. Anticipated milestones for FY 1982 will result in an advanced alternating current propulsion system for an electric vehicle that permits a 50 percent reduction in cost and weight over existing systems. Industry may find many ultimate uses for the results of this research in the development of new technologies such as batteries in automobile propulsion, utility, and residential load leveling.

The FY 1983 request of $7.22 million will fund research on new active and passive cell materials for rechargeable cells offering much higher performances and cycle life at reasonable costs, generic problems of existing rechargeable storage battery systems, and electrochemical conversion systems. We will also investigate the characteristics of existing electrode systems, ionic conductors for batteries with special emphasis on nonaqueous fluid electrodes and characterization of ion selective membranes and separators.

Energy Storage

A number of projects have been funded under the Energy Storage Program. The Department is requesting approximately $2.2 million under the Energy Conservation Research budget submission to continue basic research on electrochemistry.

Information and Regulatory Programs

No funds are being requested in FY 1983 for Information and Regulatory Programs including Residential Conservation Service, Buildings Energy Performance Standards, Federal Energy Management Programs, Gas Mileage Guides and Industrial Reporting. Although the Administration believes the regulatory and information programs should be terminated, DOE is continuing to work on those statutory responsibilities to the extent that they have been funded by the Congress. Proposed amendments to the regulations for the Residential Conservation Service were published November 3, 1981, in the Federal Register, for public comment. These amendments, when issued as final regulations, would eliminate much of the burden associated with compliance by the utility sector. Work is underway on the Buildings Energy Performance Standards in preparation for issuance of interim standards. This research is not yet completed, due to recission/deferral of FY 1981 program funds by the Congress, at the Administration's request. The FEMP program is currently completing a government-wide 10-year energy efficiency plan, reviewing agency buildings and operations plans, developing the life-cycle-cost rule, and preparing annual reports to Congress. The Annual Industrial Energy Efficiency Report covering progress toward 1980 energy-efficiency targets is being completed.

RENEWABLE ENERGY

Let me now turn briefly to the renewable programs proposed for FY 1983.

In the early 1970's, the United States began broad-based research and development programs to increase the use of renewable energy. In the early 1970's, there were essentially no privately-funded education or training programs; no manufacturing, installation, operation or maintenance capabilities; no public budgets; and little or no overall public knowledge of renewable energy systems. Now, colleges and universities offer renewable energy education courses; industrial laboratories and field testing centers provide training to technicians; and energy consumers have become increasingly aware of the potential benefits of utilizing alternate energy systems to meet their energy needs.

Major changes in the energy marketplace are also providing improved opportunities for renewable energy. The prices of petroleum and the scheduled price decontrol of natural gas have effectively removed subsidies from competing fuels: removal of unnecessary regulatory burdens has streamlined siting requirements; and R&D tax credits will stimulate private sector technology development. For a number of renewable technologies, the R&D has been essentially completed, and industrial capacity as well as consumer demand has built to the point where the private sector can assume primary responsibility for continued development or commercialization. Specifically, active heating and cooling, passive and hybrid systems, and hydropower can be, and are being, supported by private investment. While further technical investments may be possible, such developments can be left to private industry to pursue in response to market forces. Therefore, no specific FY 1983 Federal funding is being requested for these technologies. Some basic storage work will continue under the Energy Conservation Research programs described earlier.

For other technologies, the continuation of some Federal Government participation in research is needed to provide the technical base for industry to develop these concepts to a point where potential suppliers and users may begin making their own capital investment. While the strategy to meet this goal has been modified over time to reflect technical progress and the reordering of programmatic priorities, the basic premise for Federal support remains unchanged and serves as the basis for Government activity in FY 1983. With many of the demonstration projects completed and proof-of-concept clearly established for several technologies, the Department proposed to emphasize continuing long-term research while phasing out technology development efforts that can be pursued by the private sector at rates consistent with their economic potential. The FY 1983 renewable energy budget request will be used to support these research programs at a level consistent with requirements for orderly scientific advancement.

Photovoltaic Energy Technology

There has been substantial progress in photovoltaic technology and industry development over the past several years in both single-crystal silicon and other, mostly noncrystalline, materials. For single-crystal silicon, the efficiency of commercial cells and arrays has been increased from about 7 to 14 percent, the operational and lifetime reliabilities improved by about ten-fold, and, at the same time, the cost of arrays reduced by a factor of about five. The number of photovoltaic array producers has increased from a few speciality companies, using expensive manual production processes for space applications, to more than 15, many of which use semi-automated pilot production lines to serve the growing market. Industrial sales have increased from a few kilowatts in 1975 to an estimated 5 megawatts of peak capacity in 1981, which amounts to sales of about $75 million. Over this same period, industry has invested substantially in research and development, production facilities and marketing. Industry invested an estimated $100 million for such purposes in 1981. In addition to the component, module and subsystem manufacturers, there are a large number of companies providing information, engineering, design, installation, maintenance and other services to photovoltaic system users and potential users.

For FY 1983, the Department is requesting $27.035 million to continue long-term photovoltaic research that will allow the private sector to address increased efficiency, potential cost reduction and reliability improvements. Experiments will be performed to better understand the cause and effects of defects in silicon crystals. Amorphous materials will be further examined to understand the fundamental electrical and mechanical properties of amorphous substances, to examine the interfaces between dissimilar amorphous materials and to develop better deposition techniques. The physical pheonomena in electrochemical deposition processes appropriate to improved thin-film polycrystalline photovoltaic cells will be studied and evaluated. Research will additionally address new materials for very high efficiency multi-band gap cells, fluorescing materials for luminescent concentrating devices, and photoelectrochemical cells. In addition, radically new concepts for ultra-high-efficiency cells will be explored with emphasis on analysis of layer thickness, concentration gradients, and contact metallurgy.

Wind Energy Technology

Both wind energy technology and the industry have progressed substantially in the past few years. There are now some 40 companies involved in the development of small wind systems, compared to seven in the mid-1970's, and about 20 are producing and selling commercial machines. A distribution network is also forming. Approximately 15 intermediate and large scale wind turbines from about a half FY 1983. With many of the dozen manufacturers are now under construction or in the testing stage, mostly in utility power generation applications. Some of these systems have been developed without direct Federal support. Several utilities have purchased wind turbines for prototype evaluation experiments, and a few private firms are planning windfarms to produce electricity for sale to utilities.

The FY 1983 budget requests $5.4 million for operating funds and $0.1 million for capital equipment. The technical challenge of the FY 1983 program will be to develop methods that will enable machine designers to account more accurately for stresses and fatigue associated with aerodynamic and structural dynamic loads in wind turbines. Research will be continued on improved analytical techniques and models for predicting aerodynamics, structural dynamics and energy output performance of wind energy systems. Research will also continue on further refinements of atmospheric fluid dynamics models to predict the effects of short-term wind variability and small-scale wind velocity variations on the performance and structural loads on a single turbine and an array. Computer models for generic structural analysis will be validated using test data from existing experimental systems. Material property data for fiberglass/resin and other composites will be developed and test samples will undergo accelerated lifetime testing. Also, the 5-meter and 17-meter experimental Darrieus machines will be operated develop and validate models that predict vertical axis wind turbine performance. Airfoils, and lift augmentation devices with high lift-to-drag ratios, will be investigated. The aerodynamic self-feathering and stall phenomena as applied to movable rotor tips will be studied.

Small-Scale Hydropower

The small hydro program was begun in 1977 in response to the need to increase energy supplies, diversify sources, and lessen dependence on imported oil. Although hydropower is a mature technology, the small hydro industry had become dormant, due to its inability to compete with cheap oil and large, central power stations.

The Department requests no new funds for this program for FY 1983. Technical monitoring of the twenty cost-shared demonstration projects will continue and the technical and economic data will be made available to potential developers, the Federal Energy Regulatory Commission, and the states. We expect to complete formal monitoring of the 160 loan agreements during FY 1983. Staff to support the monitoring and reporting activities will be provided under the Geothermal Program for FY 1983.

Ocean Thermal Energy Conversion

The Department of Energy is requesting no additional funds for Ocean Thermal Energy Conversion (OTEC) program activities in FY 1983. With technical progress achieved to date and with completion of planned FY 1982 activities, this technology is considered to be ready for further development and commercialization by the private sector.

The focus of planned FY 1982 activities is the initiative of conceptual designs for a 40 megawatt OTEC proof-of-concept experiment. Following completion of this phase in early FY 1983, a preliminary design phase is planned with $4,000,000 proposed for deferral from FY 1982 appropriations. Further development and construction of OTEC plants is felt to be within the realm and capability of the private sector. Other research activities underway on subsystems such as the cold-water pipe and electric cable will be completed in 1982. The resulting information is expected to enable industry to make the needed decisions on market development.

STATE AND LOCAL PROGRAMS

The Office of State and Local Programs has been responsible for administering grants, providing technical assistance, and offering guidance on energy conservation to State Energy Offices, local governments, small businesses and individuals. The programs administered by this office are the Schools and Hospitals Grants Program; the Weatherization Assistance Program; the Energy Extension Service; the State Energy Conservation Programs; the Energy-Related Inventions Program; and the Appropriate Technology Program. I would like to briefly describe the current status of these program activities.

Schools and Hospitals Grants Program

The Institutional Conservation Program is designed to address the needs of local governments and local public and nonprofit institutions. Under the National Energy Conservation Policy Act (NECPA), Title III, Parts 1 and 2, the Department provides both technical and financial assistance to public and nonprofit schools, hospitals, local government and public care institutions. The specific goals and objectives for FY 1982 are:

- Allocate the $48 million appropriated for FY 1982 and award approximately 1,000 grants for energy conservation activities.
- Complete the national evaluation of the grants program.
- Conduct joint public/private efforts to explore alternatives to Federal financial assistance to support energy conservation and disseminate information as appropriate.
- Prepare for close-out of the Schools and Hospitals Grants Program.

The FY 1983 budget requests no funding for the Schools and Hospitals Grants Program and the program will be closed out in FY 1983. These initiatives may be undertaken by States and local communities since they have had direct experience in making energy conservation investments and they are better able to make decisions concerning assistance to such institutions than is the Federal Government.

Weatherization Assistance for Low-Income Persons

The weatherization program provides for the installation of energy conserving measures such as caulking, weatherstripping, attic insulation and storm windows to reduce heat loss and conserve energy in the homes of low-income people. Particular emphasis is given to the low-income elderly and handicapped. DOE has provided grants to 50 States, the District of Columbia and 25 Native American tribal organizations.

DOE's Weatherization Assistance Program awarded its first grant in August 1977. By our estimate, as of December 1981, more than 800,000 homes had been weatherized under the DOE program.

The President's FY 1983 budget requests no funding for the Weatherization Assistance Program. This Administration believes that State and local governments are better able to make decisions concerning such kinds of public assistance to the low-income and needy than the Federal Government. We are concerned about the welfare and well being of the low-income and needy in this country, but view this as a social rather than an energy issue. Therefore, the President's FY 1983 Budget provides Federal funds to the States for weatherization through the Low-Income Home Energy Assistance Program (LIHEAP), administered by the Department of Health and Human Services (HHS), and through the Community Development Block Grant Program, administered by the Department of Housing and Urban Development (HUD). Up to 15 percent of the LIHEAP funds are authorized to be allocated by States for weatherization activities. This authorizes the States to use over $225 million from HHS in FY 1982, in addition to the funds being distributed to the States by DOE for weatherization.

Energy Extension Service

The Energy Extension Service was designed to provide direct personalized information and technical assistance to small-scale energy users such as small businesses and homeowners who individually use small amounts of energy but, in aggregate, use roughly 40 percent of the Nation's supply, to assist them in using energy more efficiently including appropriate uses of renewable resources. The

Energy Extension Service Program has served to establish energy offices in the States, and to assist States in the start-up and initial development of conservation and renewable resource activities aimed at addressing those energy issues specific to a given State. As States have become increasingly able to develop and implement such activities, there is a lessening need for Federal assistance.

The FY 1983 Budget request does not therefore propose funding for the Energy Extension Service.

State Energy Conservation Program

The State Energy Conservation Program (SECP) was designed to provide States with the means to establish and implement energy conservation programs with the goal of reducing State energy consumption. The specific goals and objectives for FY 1982 are to:

- Provide 57 grants to States and territories in an expeditious fashion for funding of SECP activities.
- Prepare for FY 1983 categorical grant closeout, and
- Provide assistance to States to build capability for continuation of their most beneficial programs without Federal funds.

The State Energy Conservation Program has served to establish energy offices in the States, and to assist States in the start-up and initial development of conservation and renewable resource activities aimed at addressing those energy issues specific to a given State. As states have become increasingly able to develop and implement such activities, there is a lessening need for Federal assistance. The FY 1983 Budget request does not therefore propose funding for this program.

Energy-Related Inventions Program

The Energy-Related Inventions Program was established to evaluate the technical merits of energy-related inventions submitted. The National Bureau of Standards (NBS) has evaluated approximately 17,500 energy-saving inventions. Based on NBS recommendations, 114 inventions have been awarded grants at a cost of approximately $8.4 million for an average grant of about $78,000. No FY 1983 funds are requested for this program in light of the President's Economic Recovery Program which will increase the availability of venture capital and stimulate R&D investments.

Appropriate Technology Program

"Appropriate technology" refers to decentralized systems for producing or applying energy that are matched in scale and nature to local needs and resources. Since Fiscal Year 1978, the program's first year, the Department of Energy has evaluated nearly 45,000 proposals, selecting about 2,400 (5 percent) for funding at a total cost of $28 million. The average grant was about $12,000. Approximately 20 publications were released and about 50 workshops conducted to encourage the initiation of successful projects. Thus, the program has met its objective of supporting the research, development, and demonstration of a great variety of small-scale, decentralized renewable energy technologies by providing financial assistance.

No funds have been requested for Fiscal Year 1983 or beyond. Fiscal Year 1981 was the last grant award cycle; however, since projects are funded at the end of the fiscal year for up to 24 months, some previously funded project activity will continue through Fiscal Year 1983.

SUMMARY

As the program levels in the FY 1983 budget reflect, we have initiated a new direction regarding the appropriate Federal role in energy development and conservation, in keeping with the President's goals of economic recovery and reliance on the private sector.

Mr. Chairman, this concludes my formal statement. I would be pleased to respond to any questions.

Senator Weicker. Senator Percy noted that the appropriations subcommittee asked you to prepare plans for conservation programs with funding at three different levels—200 million, 300 million, and 400 million.

Can you inform the subcommittee what progress you have made in developing these plans?

Mr. Tribble. Starting this afternoon we will begin to examine all the programs that are under my jurisdiction. We have all of them set up on what we term a management by objective system. We will look at the accomplishments that we have set forth in the long-range plan and determine the next steps along the way toward those accomplishments, and we will then rank these in order of priority so that we will be able then to determine what we could do in 1983 with different levels of funding.

Senator Weicker. The General Accounting Office in their review of the administration's budget proposal for energy and related programs states that GAO believes there is a continuing need for a strong Federal role in key energy areas, including conservation.

The Energy Research Advisory Board report to Deputy Secretary Kenneth Davis states, "In view of the fragmented, underutilized building industry, a Federal role is highly appropriate in this R. & D. field."

The draft report by Oak Ridge National Laboratory says that, on the role of Federal conservation programs, that economists attribute nearly 5 quads of energy savings between 1973 and 1980 to Federal conservation programs, another 7 quads due to rising prices, 10 quads to slower economic growth.

Despite the findings and recommendations of these noted energy experts, the proposal is to terminate 85 percent of conservation R. & D., 100 percent of State and local energy planning, including low-income weatherization.

What specific evidence does this administration have to justify these cuts in the face of these other recommendations?

Mr. Tribble. You mentioned the building industry, and we certainly recognize that the building industry is a diverse industry. There are no very large companies. There is not an association of builders that has any substantial research budget.

I would like to tell you some of the work that we have been doing, and that we will expect to complete in fiscal 1982 toward the development of guidelines for the building industry.

Lawrence Berkeley Laboratory is working on a number of technical reports. The technical report will be based on enhancement of past and current residential research. This effort will be expanded, utilizing funds to produce what is necessary for national guidelines. The residential report can probably be produced within 10 months.

The five prototypes are one-story ranch, two-story, split level, outside townhouse, and inside townhouse. The prototypes used for analysis are the same for each climate area. The number of climate areas addressed ranges from 12 to 48, depending on the prototype. Alaska and Hawaii are included. The number of areas is large enough that we can generate data for any climate situation in the United States. Energy savings information is being generated by LBL under the following headings—annual heating load stated in

Btu's, annual cool load stated in Btu's, annual heating energy stated in Btu's, annual cooling energy stated in kilowatt hours.

LBL is analyzing the following conservation strategies—15 combinations of insulation and glazing, variations in area of glazing, variations in the distribution of glazing, movable night insulation, shading of glass, variation in air infiltration, different equipment efficiencies, variations in building shape.

We feel this approach is the most useful to the homebuilding industry. Any need for manuals, standards, and simplified evaluation techniques is eliminated. This is the form that the building industry has demonstrated that they will be able to use in the easiest fashion. This work is going on now at LBL and will be completed with fiscal 1982 funds.

This is one of the points that I make that we certainly are not opposed to conservation. We simply want to do those things that we think will be helpful. Beyond this point, about the only thing that we could continue to do—and incidentally, this program is for residential buildings, an additional program for mobile homes, and another one is on-going for commercial buildings.

We do not have an extensive effort going forth in commercial buildings as we do in residential buildings because many more of the buildings of a commercial nature are built by architects and engineering firms who do have the expertise to examine heat loss considerations and install the appropriate equipment.

I'm sorry if I gave you a terribly long answer to the question you raised, but I felt that it is important to put on the record the fact that we are not ignoring conservation. We are doing those things that we feel will be most cost effective.

Senator WEICKER. But again I would have to ask the question what are those things that we, that is, the Government, is doing to enhance conservation in this country? I have yet to really see any hard evidence by virtue of your testimony coming forth as to what you in your Department are doing to enhance conservation.

I see your massive cutbacks. I don't quite understand what it is you are doing to enhance conservation.

Mr. TRIBBLE. Simply providing the building industry with this kind of information will enable them to build more efficient buildings. Buildings do consume a very high proportion of the energy in the country, and we are giving them the tools to use to build more energy-efficient buildings.

Senator WEICKER. Why should they build them?

Mr. TRIBBLE. Because the economics are going to demand it. The public is a great deal more sophisticated with respect to energy consumption than it was back in 1970, and if you look at the advertisements that many of the builders are putting in the media, you will find that one of the factors that they mention most often is the energy efficiency of their product.

Senator WEICKER. You honestly feel that the public will take this conservation duty on its shoulders without any impetus or any requirements of the Federal Government and do so in an effective way?

Mr. TRIBBLE. In most areas, yes. Let's take the industrial area first. Any money that is saved on fuel bill drops right down to the bottom line, and of course, it gets the attention of management if energy is a principal component of manufacturing costs.

It is much to be preferred to have the industry make those energy conservation measures that are peculiar to their particular situation, whether it is the local plant, or to the industry, much more effective to have them make the decisions as to which things will be done.

As an indication of their activity in this field, the 10 most energy-intensive industries between the years 1972 and 1980 accomplished an energy efficiency improvement on a Btu per unit of production basis of 17.6 percent. This is a clear indication that industry then will undertake those conservation activities.

Senator WEICKER. Under this reasoning then, what is the justification for the continuation of your Department?

Mr. TRIBBLE. There are some research activities that we feel are legitimate and should be continued both in the conservation area and in the renewable resources. We recognize that renewable energy cannot serve all of our needs, but on the other hand, they can serve a proportion of the needs of the country, and we would like to push for the development of the use of those sources of energy to the point where they can be utilized whenever they are economical.

For example, using biomass as a fuel, it has a definite constraint because of the limited radius within which you can afford to haul the weighty material. Generally it is about a 50-mile radius. We would like to see the use of biomass for fuel expansion to be used wherever it is economical.

The same thing is true of wind, photovoltaics, geothermal, and other forms of renewable energy. There are some things in research that we would propose to go forward with to help accelerate, not accelerate, but give the industries the technology base from which to operate.

Senator WEICKER. What about the State and local programs?

Mr. TRIBBLE. The State and local programs have largely been grant programs. They were initiated in the period when there was no such thing as a State energy office. Generally there may have been some States that had such, but one of the programs was to assist the States in setting up State energy offices and to get familiar with the problems raised by the new energy situation.

The weatherization program certainly addressed a need that came about by virtue of their higher prices. On the other hand, there are some 12 to 13 million homes that now qualify for assistance under the weatherization program, and to date, this Department has weatherized on the order of 800,000 homes. This would take a number of years. At the present time the limit of expenditure per home is on the order of $1,000, so you can see that it would take a number of years and several billions of dollars to do the entire job.

We feel that things of this nature should be done not in the Department of Energy, but that these grants should be handled through those agencies in the Federal Government that are more familiar with dealing with grants to the lower income segment of society.

Senator WEICKER. I believe that the public expected that with the advent of decontrol that there would still be two primary functions of the Department of Energy—No. 1, development of alternate sources of energy, and No. 2, conservation. The public was more than glad to see the Department of Energy trimmed down to size in terms of where there would be no necessity to have great numbers of persons aboard charged with the responsibility of supervising regulations.

I would like to know by what mandate the administration feels that the conservation effort ought to be minimized? I don't understand it, Mr. Tribble, and I don't think that Senator Percy and Senator Hatfield—I think they were making their point very clear.

We all had to live through this crisis from its inception. The reasons why we are in the predicament we are in was No. 1, all the Democrats were running around here against decontrol, deregulation, so there was no way that we could effectively get a handle on the supply side of the problem.

All the Republicans were running around here refusing to do anything about conservation, so there was no way we could effectively get a handle on the demand side. We were confronted with the reality thrust upon this Nation by the Arab states, and we were trying to deal with it in a philosophical way, which meant doing nothing at all.

Now we have had to decontrol, deregulate, which I might add I supported 100 percent. The supply side seems to be coming along all right in that regard, but by what stretch of the imagination anybody felt that you could avoid the disagreeable aspect of conservation I would like to know, and I found nothing in the explanation of either you or your Department which justifies in effect gutting the entire conservation effort of the Nation.

This doesn't mean to say the conservation effort of the private sector. I assume they do certain things in their economic self-interest, but what has changed out there insofar as the great American public is concerned that would lead you to believe that they are not going to place themselves in exactly the same position they were in in 1974–75?

Mr. TRIBBLE. I think the very price that they are having to pay for energy is going to continue to be an economic incentive to conserve energy.

Senator WEICKER. Once that price gets ground in—it has been quite a while ever since we got bombed on this subject. It has taken a long time for us to assimilate the price of energy in our whole economy, and indeed I have long belonged to the school that felt that by far and away the greatest threat to our economy was the energy situation or the lack of a solution for it rather than Government spending.

Now I admit that that might play a role, but to me what really upset this economy, and we are only now recovering from it as we assimilate the high cost of energy into the economy as a whole, and I just quite frankly don't think that price is going to have any more effect in the short period of time. I just don't think it is, and then what happens?

Conservation? Really, truly, what is it going to take? Another effective wielding of the OPEC cartel power to get our act together? I think we were all counting on you and your Department to put us in the position where there would never again be a repeat of the vulnerability of this Nation as was the situation in 1974–75, and what you are saying is you are about ready to walk off the stage.

Mr. TRIBBLE. Let me address one other aspect of the reason that we feel that there will continue to be conservation. In 1975 the new car fuel economy was 13.9 miles per gallon, and at about that time legislation was enacted to mandate improved mileage for the domestically produced automobiles. Immediately there was an improvement.

However, another factor took over, and that was the demand of the public for an even improved efficiency and for even competition which was providing that, and so that after a couple of years the mileage of the new car fleet exceeded the mandated levels that were set by the legislation, and that has been the situation since that time.

In 1981 the on-the-road new car fuel economy was 22.3 miles per gallon, which is some 60 percent improvement over that in 1975. As these new cars come on the road and replace the old cars that were the low-efficiency models, the fleet will improve, so that we would expect that 5 years down the road after many of these old gas guzzlers have been, their lives have run out, that the fleet average will be substantially improved. This is one of those ways in which the price of fuel is mandating that conservation continue.

We have I feel learned our lesson. The public is demanding better gas mileage and domestic producers will accommodate that demand.

Senator WEICKER. How many homes do you estimate were in need of weatherization?

Mr. TRIBBLE. Between 12 and 13, well, 12 and 13 million qualified under the present law.

Senator WEICKER. How many have been weatherized?

Mr. TRIBBLE. Our Department, on the order of 800,000.

Senator WEICKER. What is going to happen to the remaining 11 odd million?

Mr. TRIBBLE. This is the extent of the problem that faces us if we do in fact attempt to weatherize them all.

Senator WEICKER. Who is going to do it?

Mr. TRIBBLE. We think that the funds that are available through the HHS that can be used for that purpose, if the discretion of the States is such that it should be, would be the appropriate way for the Federal Government to participate in this weatherization program.

Senator WEICKER. How would you suggest the Federal Government participate?

Mr. TRIBBLE. The funds for the HHS under the low-income energy improvement program—I think that's it. There is a program there that has on the order of $1.3 billion in 1983, no, in 1982, and the provisions of the law are such that 15 percent of that can be used for weatherization.

Senator WEICKER. Well, Mr. Tribble. Let me say this, that whether it is in terms of drawing away from the commitment to weatherization, whether it is the diminishing of your staff, whether it is the laws of heating and cooling buildings going off the books—the

55-mile-per-hour speed limit is going to be next—I believe that you and this administration are putting the neck of this country into a noose.

Let me tell you what I consider to be the role of Government, and good Government. Very simply put, it is to anticipate crisis and not to react to it.

You know your Nation as well as I do, and you know the vulnerability of this country as well as I do, and you know the lifestyle habits of this country as well as I do, and we have got a short reprieve here. Instead of using it, we are throwing it out the window.

I intend to do everything I can as between the authorization part of this exercise and teaming up with my colleagues on the appropriations side to keep you in business. Maybe you want to get out, but I think the overwhelming feeling is that you ought to be in, and in it a lot deeper than as presented by your remarks here today or the policies of this administration, so I suspect we are going to be meeting once again on these matters, and I cannot express any more succinctly or eloquently than was done by Senators Hatfield and Percy my own personal disappointment as to this lost opportunity of this Republican administration, and hurray for the good old conservative attitude we don't want Government telling everybody what to do. Sometimes you have to tell people what to do.

We are just paying one hell of a dollars-and-cents price right now for our lack of preparedness several years ago, and we ignore that. My God.

I have further questions that will be submitted for response to the record in order to move the hearing on. We have one more panel, and the hearing has to end at 10:30. I would ask that those questions be responded to for the record.

Thank you very much for your consideration.

Mr. TRIBBLE. Thank you, sir.

Senator WEICKER. The next witnesses will be a panel consisting of Mr. Louis Roddis, Chairman of the Energy Research Advisory Board, John Gibbons, Director, Office of Technology Assessment, and David Moulton, Policy Director of the Energy Conservation Coalition.

Gentlemen, we are constrained here to about 15 minutes of time. Your statements in their entirety will be placed in the record at this point. I would ask that you proceed in the way of summary, so with that request, I apologize for any inconvenience caused. Why don't you proceed in any manner you deem fit?

STATEMENT OF LOUIS H. RODDIS, JR., CHAIRMAN, ENERGY RESEARCH ADVISORY BOARD, DEPARTMENT OF ENERGY

Mr. RODDIS. I am Lou Roddis, Chairman of the Energy Research Advisory Board, which is the senior level technical advisory board in the Department established in 1978 and chartered under the Federal Advisory Committee Act. We have no direct voice in policymaking, of course. We are an advisory group composed of a number of private citizens drawn from industry, universities, public interest groups, State and local government. Members are appointed by the Secretary to serve on a voluntary basis, and we are not special Government employees.

I am speaking as a representative for the Board in the matter that I was asked to comment on, which is the job we did on establishing Federal energy R. & D. priorities, our recommendations as a Board.

Senator **Weicker**. Why don't you pull the microphone up?

Mr. **Roddis**. All 21 active members of the Board participated in the arrangements over some 2 years. We had a unanimous agreement on 47 or the 49 rankings that were produced. We took into account a number of factors in arriving at these rankings.

Because of the way the Department of Energy Act is formulated, we are unable to receive administrative-type information. We can only close our meetings to the public for national defense and proprietary items, so we are unable to actually deal with the budget during its formative period. Our recommendations were submitted last November, and we are not directly impacting the preparation of the 1983 budget, although they certainly were available in the record to the Department before the budget was formally submitted to Congress.

Our recommendations were in four general areas. I know you are only interested in one, so I will just indicate the others.

Science and technology base—by and large we recommended a continuation of the program at about the same level, and the Department has adopted that.

Electric-related supply technology—we considered that it was perhaps too much money being put in that general area.

Fuel or fossil fuel supply technologies—we in general concluded that the directions which the Department of Energy was going in aimed more at the small-scale work since the large demonstration projects were a part of the Synthetic Fuels Corporation. In the area of utilization and conservation technology, we made several major recommendations.

First, the overall level of R. & D. funding for conservation and improved utilization programs is too low. That was against the 1982 recommendations. We did not see the 1983 budget, so obviously we consider zero even lower.

Second, R. & D. in buildings and community systems needs increased funding in view of the large amount of energy consumed in this sector and the lack of private sector institutions able to undertake building systems R. & D. In the transportation sector, we thought the work should be redirected away from present heavy emphasis on automotive engines and toward the heavy freight truck sector.

Funding in the multisector conservation programs should remain the same and should be concentrated on work in the energy conversion and utilization technology program.

Funding for industrial conservation programs should be restored to approximately the level in fiscal 1981. The Board thought that the implementation of these recommendations should lead to a more judicial balance of the DOE's R. & D. budget and to a reduction of the total budget compared to 1981.

We further were asked by the Department after submitting this report to look more closely at our recommendations in the conservation area. I formed a very able panel which is chaired by Grant Thompson of the Conservation Foundation and who is a member of ERAB who is in the room today if you wish to question him.

The membership of the panel is distinguished people, not members of the ERAB in general, from thoughtout all segments of industry who are interested in the energy conservation area, people such as Rob Socolow from Princeton, Mason Willrich from Pacific Gas & Electric, Gerry Decker from Kaiser, Tom Schelling from Harvard, Paul Chenea from General Motors, Jan Brinch from the Association of Idaho Cities are representative of the membership. A copy of that list and the charge letter should be part of the record here as an attachment.

We are looking further at the role of energy, the Federal role in other energy R. & D. areas other than the conservation one, and in closing, I would just like to enter for the record two documents and comment on the Federal advisory process and its limitations because we are very conscious of these.

I think it will be quite interesting for the subcommittee and the parent committee to see these. One is a recent publication of the Charles F. Kettering Foundation, "Federal Advisory Committees: An Important Frustration." Another is a publication of the National Research Council entitled, "Private Sector Participation in Federal Energy R.D. & D. Planning." Although it was printed 4 years ago, the very final appendix on legal impediments could have been written yesterday.

Senator WEICKER. Thank you very much. All those books and statements will be included in their entirety in the record at this point. Thank you very much, Mr. Roddis.

[The prepared statement and additional material submitted by Mr. Roddis follow. Testimony continues on p. 487.]

TESTIMONY OF

LOUIS H. RODDIS, JR.

CHAIRMAN
ENERGY RESEARCH ADVISORY BOARD

ON

FEDERAL ENERGY R&D PRIORITIES

BEFORE THE
SUBCOMMITTEE ON ENERGY CONSERVATION AND SUPPLY
ENERGY AND NATURAL RESOURCES COMMITTEE

U. S. SENATE
DIRKSEN SENATE OFFICE BUILDING

MARCH 30, 1982

I. INTRODUCTION

MR. CHAIRMAN AND MEMBERS OF THE COMMITTEE--

THANK YOU FOR THIS OPPORTUNITY TO DISCUSS WITH YOU THE ENERGY RESEARCH ADVISORY BOARD'S RECENT REPORT TO THE DEPARTMENT OF ENERGY ON FEDERAL ENERGY R&D PRIORITIES.

FIRST, FOR THOSE MEMBERS UNFAMILIAR WITH THE BOARD, I SHOULD POINT OUT THAT THE BOARD (ERAB) IS AN INDEPENDENT ADVISORY COMMITTEE ESTABLISHED BY DOE IN 1978 AND CHARTERED UNDER THE FEDERAL ADVISORY COMMITTEE ACT. IT IS THE HIGHEST LEVEL SCIENCE AND TECHNOLOGY ADVISORY COMMITTEE IN DOE, REPORTING TO THE SECRETARY OF ENERGY. MEMBERS ARE DISTINGUISHED PRIVATE CITIZENS DRAWN FROM INDUSTRY, UNIVERSITIES, PUBLIC INTEREST GROUPS, AND STATE AND LOCAL GOVERNMENT. MEMBERS, WHO ARE APPOINTED BY THE SECRETARY, SERVE ON A VOLUNTARY BASIS AND ARE NOT SPECIAL GOVERNMENT EMPLOYEES.

OF COURSE, THE BOARD'S ROLE IS ADVISORY ONLY AND HAS NO DIRECT VOICE IN POLICY MAKING. CONVERSELY, I MUST ALSO POINT OUT THAT NEITHER THE ERAB NOR MYSELF REPRESENT THE VIEWS OF THE DEPARTMENT OR THE ADMINISTRATION. WHEN SPEAKING ABOUT THE R&D PRIORITIES REPORT, I AM SPEAKING FOR ERAB.

OVER THE COURSE OF THE LAST THREE YEARS, ERAB HAS BEEN CONCERNED WIT VARIOUS R&D REVIEWS OF NUMEROUS TECHNOLOGICAL AND SCIENTIFIC PROGRAMS OF THE DEPARTMENT OF ENERGY, INCLUDING REVIEWS OF SUCH TECHNOLOGIES AS MAGNETIC FUSION ENERGY, ADVANCED ISOTOPE SEPARATION, BIOMASS ENERGY, AND MANY OTHERS.

One of our most comprehensive tasks has been the review of energy R&D priorities undertaken by the Board at the request of the Deputy Secretary. Specifically, the Board was asked for advice on DOE's R&D priorities and on the "hard choices" the Department must soon make as to "which programs to pursue vigorously and which to de=emphasize based on a realisitc appraisal of both our energy options and energy needs for the foreseeable future." The study responding to that request was chaired by John Foster of TRW and Bill McCormick of American Natural Resources.

In this study we have tried to assure that the context of our advice on R&D priorities, particularly with respect to the Federal role, is consistent with the Administration's goals, while at the same time maintaining the most effective use of increasingly limited R&D resources. Our chief concern was the role of federally-sponsored R&D, as opposed to privately-sponsored energy R&D, in providing new energy supplies and conservation technologies to meet the energy requirements of the Nation.

II. BACKGROUND AND METHODOLOGY

THE R&D PRIORITIES REPORT ACTUALLY BUILDS ON A TWO-YEAR EFFORT OF THE R&D PANEL. IN THE FIRST PHASE OF THIS EFFORT, THE PANEL WAS ASKED BY DOE TO REVIEW THE ADEQUACY OF THE ENERGY TECHNOLOGY BASE. THIS RESULTED IN A REPORT TITLED R&D NEEDS IN THE DEPARTMENT OF ENERGY, SUBMITTED IN SEPTEMBER OF 1980. THE BOARD NOTED THAT THIS EFFORT DID NOT ADEQUATELY ADDRESS THE QUESTION OF PRIORITIES AND BALANCE BETWEEN R&D PROGRAMS GIVEN THE INCREASINGLY STRINGENT BUDGETS THAT DOE WOULD BE FACING IN THE NEAR FUTURE.

IN THE 1981 PHASE OF THIS EFFORT, THE BOARD ACTING AS A PANEL OF THE WHOLE EXPLORED ALTERNATIVE METHODS FOR ASSESSING R&D PRIORITIES INCLUDING THE USE OF VARIOUS ENERGY MODELS. MOST OF THESE METHODS WERE FOUND TO BE MISMATCHED TO THE TASK AT HAND. A SIMPLE RANKING METHOD WAS ADOPTED THAT TOOK INTO ACCOUNT THE LIMITED TIME AVAILABLE, INCOMPLETENESS AND UNRELIABILITY OF DATA, THE JUDGEMENTAL NATURE OF THE DECISIONS FACING THE DEPARTMENT, AND PITFALLS OF TRYING TO FORETELL THE FUTURE.

---

* NOTE: THE METHODS USED ARE MORE THOROUGHLY DOCUMENTED IN THE REPORT AND WORKING PAPERS OF THE PANEL, IF THESE ARE OF INTEREST.

RECOMMENDATIONS OF THIS STUDY RESULTED FROM APPLICATION OF BOTH A NEW ASSESSMENT METHODOLOGY DEVELOPED BY THE R&D PANEL OF ERAB AND MORE CONVENTIONAL AND TRADITIONAL EVALUATION TECHNIQUES. THE NEW METHODOLOGY REQUIRED BOARD MEMBERS TO EVALUATE EACH R&D PROGRAM IN TERMS OF A SPECIFIC SET OF WELL DEFINED CRITERIA.

SEVEN CRITERIA WERE SELECTED TO EVALUATE ENERGY TECHNOLOGY PROGRAMS INCLUDING TECHNOLOGICAL POTENTIAL (RISK), URGENCY, ECONOMIC POTENTIAL BENEFIT/COST RATIO, ENERGY SECURITY, HEALTH AND ENVIRONMENTAL IMPACTS, AND FEDERAL R&D ROLE. FIVE CRITERIA WERE USED TO EVALUATE SCIENCE AND TECHNOLOGY BASE PROGRAMS INCLUDING SCIENTIFIC POTENTIAL, INVENTIVE POTENTIAL, MISSION IMPACT, AS WELL AS THE SAME URGENCY AND FEDERAL ROLE CRITERIA.

THIS METHODICAL APPROACH INSURED THAT EACH PROGRAM WAS EVALUATED COMPREHENSIVELY BY EACH MEMBER. THE EVALUATIONS OF ALL R&D PANEL MEMBERS WERE THEN COMBINED NUMERICALLY. THESE COMPOSITE EVALUATIONS WERE THEN USED AS THE BASIS FOR MORE TRADITIONAL JUDGMENTS, DISCUSSIONS AND CONSENSUS BUILDING, LEADING TO CONCLUSIONS AND RECOMMENDATIONS BY THE BOARD.

III. FINDINGS AND RECOMMENDATIONS

INCLUDED WITH MY TESTIMONY IS A COPY OF THE DETAILED ERAB REPORT. OUR CONCLUSIONS ARE ORGANIZED AROUND FOUR MAJOR ENERGY R&D CATEGORIES. THE FIRST CATEGORY, THE ENERGY SCIENCE AND TECHNOLOGY BASE, EMBODIES THE FUNDAMENTAL RESEARCH AND TECHNOLOGY WHICH IS THE UNDERPINNING FOR INNOVATIVE NEW IDEAS IN CONSERVATION AND ENERGY SUPPLY. THE SECOND CATEGORY IS THOSE ENERGY SUPPLY R&D PROGRAMS WHICH HAVE AS THEIR PRIMARY FOCUS THE PRODUCTION OF ELECTRIC ENERGY. THE THIRD CATEGORY IS COMPRISED OF R&D ON ALL OTHER FORMS OF FUEL SUPPLIES FOR VARIOUS ENERGY END USES. THE FOURTH CATEGORY IS THOSE R&D PROGRAMS WHICH CONTRIBUTE TO MORE EFFICIENT UTILIZATION AND CONSERVATION OF OUR SCARCE ENERGY RESOURCES.

OVERALL, THE BOARD CONCLUDED THAT: "IF ITS RECOMMENDATIONS ARE IMPLEMENTED, A NET REDUCTION IN DOE'S BUDGET WILL RESULT." IN 47 OF 49 RECOMMENDATIONS IN AREAS OF SCIENCE AND TECHNOLOGY, THE BOARD WAS UNANIMOUS.

A. SCIENCE AND TECHNOLOGY BASE

BEGINNING FIRST WITH OUR RECOMMENDATIONS IN THE AREA OF SCIENCE AND TECHNOLOGY BASE, I WOULD NOTE THAT PROGRAMS IN THIS AREA IN GENERAL WERE RANKED HIGHER IN PRIORITY THAN THE OTHER CATEGORIES AND THAT THIS AREA WAS ONE OF SIGNIFICANCE WITH REGARD TO A STRONG CONTINUED FEDERAL ROLE.

B. ELECTRIC-RELATED SUPPLY TECHNOLOGY

THE ERAB CONCLUDED THAT THE HIGHEST PRIORITY IN THE ELECTRIC SUPPLY AREA SHOULD BE GIVEN TO THE SUPPORT OF NUCLEAR WASTE DISPOSAL PROGRAMS, CONVENTIONAL REACTOR SYSTEMS AND SAFETY, THE LIQUID METAL FAST BREEDER REACTOR BASE PROGRAMS, AND URANIUM ENRICHMENT R&D.

C. FUEL SUPPLY TECHNOLOGY

THIS SECTOR OF ENERGY SUPPLY IS NOT AS HIGHLY REGULATED AS THE ELECTRIC ENERGY INDUSTRY AND HAS HISTORICALLY DEVELOPED THESE SUPPLIES WITH PRIVATE RESOURCES. IN GENERAL, ERAB CONCLUDED THAT ENERGY TECHNOLOGIES SUCH AS ENHANCED GAS AND OIL RECOVERY CAN HAVE AN EARLY IMPACT IN THE MARKETPLACE BUT THAT THE FEDERAL ROLE IS SIGNIFICANTLY LESS SINCE PRIVATE INDUSTRY SHOULD DEVELOP THESE SOURCES. THE BOARD RECOMMENDED THAT THESE PROGRAMS COULD THUS BE REDUCED AND THAT THE MAJOR FEDERAL EFFORT IN SYNTHETIC FUEL RESEARCH AND DEVELOPMENT BE DIRECTED AT INNOVATIVE CONCEPTS AND SMALL, PILOT-PLANT SCALE DEVELOPMENT.

D. UTILIZATION AND CONSERVATION TECHNOLOGY

NOW WITH REGARD TO ENERGY CONSERVATION AND END-USE TECHNOLOGY PROGRAMS, ERAB CONCLUDED THAT THE R&D FUNDING WAS TOO LOW COMPARED TO THE SUPPLY TECHNOLOGIES. THE BOARD'S OVERALL RECOMMENDATION WAS THAT A BETTER BALANCE WITH OTHER PROGRAMS COULD BE ACHIEVED BY INCREASING FUNDS ALLOCATED TO BUILDINGS AND COMMUNITY SYSTEMS AND INDUSTRIAL CONSERVATION.

WITH REGARD TO SPECIFIC CONSERVATION AND UTILIZATION R&D PROGRAMS, THE MAJOR CONCLUSIONS AND RECOMMENDATIONS OF THE BOARD WERE AS FOLLOWS:

1. THE OVERALL LEVEL OF FEDERAL R&D FUNDING FOR CONSERVATION AND IMPROVED UTILIZATION PROGRAMS IS TOO LOW IN VIEW OF THEIR POTENTIAL FOR ENERGY IMPROVEMENTS AND THE INABILITY OF MANY IMPORTANT ENERGY-CONSUMING SECTORS TO CONDUCT R&D.

2. R&D IN BUILDINGS AND COMMUNITY SYSTEMS NEEDS INCREASED FUNDING IN VIEW OF THE LARGE AMOUNT OF ENERGY CONSUMED IN THIS SECTOR AND THE LACK OF PRIVATE SECTOR INSTITUTIONS ABLE TO UNDERTAKE BUILDING SYSTEMS R&D.

3. R&D IN THE TRANSPORTATION SECTOR SHOULD BE REDIRECTED AWAY FROM ITS PRESENT HEAVY EMPHASIS ON AUTOMOBILE ENGINES AND TOWARD THE HEAVY FREIGHT TRUCK SECTOR. TRANSPORTATION SYSTEMS UTILIZATION ACTIVITIES DESERVE SUPPORT. OVERALL, FUNDING LEVELS IN THIS AREA SHOULD REMAIN THE SAME.

4. FUNDING FOR THE MULTI-SECTOR CONSERVATION PROGRAM SHOULD REMAIN THE SAME AND SHOULD BE CONCENTRATED ON WORK IN THE ENERGY CONVERSION AND UTILIZATION TECHNOLOGY PROGRAM (ECUT).

5. FUNDING FOR THE INDUSTRIAL CONSERVATION PROGRAMS SHOULD BE RESTORED TO APPROXIMATELY THE LEVEL IN FY81. MANY INDUSTRIES HAVE NO CAPACITY FOR PRIVATE SECTOR R&D AND THE CLOSE COOPERATION WITH USERS THAT CHARACTERIZED THIS PROGRAM DESERVES CONTINUATION.

THE BOARD THOUGHT THAT IMPLEMENTATION OF THESE RECOMMENDATIONS COULD LEAD TO A MORE JUDICIAL BALANCE OF THE DOE'S R&D BUDGET AND TO A REDUCTION IN THE TOTAL BUDGET COMPARED TO FY 81.

IV. CONSERVATION R&D ISSUES

OBVIOUSLY, THERE ARE MAJOR DIFFERENCES BETWEEN ERAB'S RECOMMENDATIONS ON CONSERVATION R&D AND THE DEPARTMENT'S PROPOSED FY 1983 BUDGET. FOR INSTANCE, ERAB SUGGESTED THAT FUNDING FOR THE INDUSTRIAL AND BUILDINGS CONSERVATION R&D PROGRAMS SHOULD BE INCREASED WHILE THE FY 1983 BUDGET ELIMINATES THESE PROGRAMS. HOWEVER, IT SHOULD BE NOTED THAT ERAB RECOMMENDATIONS IN THIS REGARD ONLY ADDRESSES R&D, NOT GRANTS-IN-AID TO THE STATES OR SUBSIDIES TO INDUSTRY FOR CONSERVATION SPENDING.

I THINK THESE DIFFERENCES BETWEEN ERAB AND DOE REFLECT A DIFFERING VIEW OF HOW THE PRIVATE ECONOMY WILL RESPOND TO THE SIGNALS GIVEN BY HIGHER FUEL PRICES IN MAKING ITS CONSERVATION INVESTMENTS OR IN DOING R&D ON EFFICIENCY IMPROVEMENTS. THE DEPARTMENT CONTINUES TO SUPPORT THE VIEW THAT SUCH DECISIONS ARE BEST LEFT PRIMARILY TO THE MARKETPLACE AND THAT THE NEEDED R&D SHOULD BE PRIMARILY LEFT TO THE PRIVATE SECTOR. ON THE OTHER HAND, THE BOARD'S VIEWS ON THE FEDERAL ROLE IN ENERGY R&D SUGGESTS THAT, WHILE THE MARKETPLACE IS THE CORRECT APPROACH, THERE ARE SOME SPECIAL CIRCUMSTANCES AND VALID EXCEPTIONS TO THIS GENERAL RULE THAT SHOULD BE CONSIDERED BY DOE IN MAKING BUDGET DECISIONS. I WILL DISCUSS SOME OF THESE EXCEPTIONS WITH REAGRD TO THE PROPER FEDERAL ROLE IN ENERGY R&D IN A MOMENT.

IMPROVING THE EFFICIENCY OF ENERGY USE IS UNQUESTIONABLY IMPORTANT FOR THE COUNTRY. MANY EFFICIENCY IMPROVEMENTS ARE, IN FACT, TAKING PLACE AND OVER THE PAST FOUR YEARS THE NATION'S TOTAL USE OF ENERGY

HAS REMAINED ABOUT CONSTANT. HIGHER PRICES HAVE GOTTEN EVERYONE'S ATTENTION. IT IS DOE'S POSITION THAT THIS TREND WILL CONTINUE AND THAT THOSE INVESTMENT DECISIONS ARE BEST LEFT TO PRIVATE INDIVIDUALS AND BUSINESSES. ERAB AGREES IN GENERAL. HOWEVER, THE QUESTION REMAINS AS TO WHETHER THIS PROCESS NEEDS TO BE HELPED ALONG BY FEDERAL R&D IN SOME SPECIAL AREAS.

RECOGNIZING THE IMPORTANCE OF THESE ISSUES AND QUESTIONS, THE DEPARTMENT HAS ASKED ERAB TO TAKE A MORE DETAILED LOOK AT THESE VERY ISSUES REGARDING THE RELATIVE FEDERAL AND PRIVATE SECTOR ROLES IN CONSERVATION R&D. SPECIFICALLY, THE BOARD WAS ASKED FOR ADVICE AND RECOMMENDATIONS FOR ACTION ON THE FOLLOWING ITEMS:

- RESEARCH AND DEVELOPMENT ACTIVITIES IN ENERGY CONSERVATION THAT SHOULD BE PURSUED BY THE FEDERAL GOVERNMENT
- THE FEDERAL GOVERNMENT'S CAPABILITY AS A CONSUMER OF ENERGY TO CONDUCT R&D IN AN EFFORT TO IMPROVE ITS OWN USE OF CONSERVATION TECHNOLOGIES
- INSTITUTIONAL RESTRAINTS AND MARKET STRUCTURES THAT PREVENT ENERGY PRICES FROM CALLING FORTH AN APPROPRIATE MARKETPLACE RESPONSE IN EFFICIENCY IMPROVEMENTS, AND
- HOW THE ABILITY AND INCENTIVE OF THE VARIOUS SECTORS OF OUR ECONOMY TO CONDUCT EFFECTIVE CONSERVATION RESEARCH BOTH ON MANUFACTURING PROCESSES AND FINAL PRODUCTS CAN BE IMPROVED.

ERAB has formed a very able Panel chaired by Grant Thompson of The Conservation Foundation to respond to this request. (The Panel membership list and charge letter are attached for the record.) The Panel has already met three times and is working on a report due in September 1982. One important question which the Panel is focusing on concerns what the Federal Government itself should be doing to improve its own use and conservation of energy in Government facilities and operations. There is reason to believe that the Federal Government is not performing as well as the private sector in this regard.

The Federal budget process does not in general inspire life cycle cost/benefit trade-offs. Another important focal point is defining the proper Federal role in conservation R&D on a technology by technology, industry by industry basis. This question of Federal role is important because it underlies many budget decisions and was explicitly treated in the ERAB R&D Priorities Report.

V. FEDERAL ROLES IN ENERGY R&D

WITH REGARD TO FEDERAL ROLE, ERAB AGREED WITH THE ADMINISTRATION'S POLICY OF GREATER RELIANCE ON THE PRIVATE SECTOR WHENEVER POSSIBLE, ESPECIALLY IN THE DEMONSTRATION AND COMMERCIALIZATION PHASES. ERAB BELIEVES THAT MUCH, PERHAPS MOST, OF NEW ENERGY SUPPLIES AND GREATER EFFICIENCY IN ENERGY USE WILL IN FACT BE ACHIEVED BY HIGHER ENERGY PRICES. BUT ERAB IS ALSO CONCERNED THAT SOME ENERGY R&D OF GREAT POTENTIAL SIGNIFICANCE FOR THE ACHIEVEMENT OF THE NATION'S ENERGY GOALS WILL FALL BETWEEN FEDERAL AND INDUSTRY RESPONSIBILITIES THE NEW POLICY RECOGNIZES THAT PRIVATE INDUSTRY CANNOT BE EXPECTED TO DO BASIC ENERGY RESEARCH OR PROJECTS OF A LONG-TERM, HIGHER-RISK CHARACTER. BUT THERE ARE OTHER CIRCUMSTANCES IN WHICH IT WOULD BE UNREALISTIC TO EXPECT TIMELY AND EFFECTIVE ASSUMPTION BY INDUSTRY OF R&D RESPONSIBILITIES ABDICATED BY THE GOVERNMENT, HOWEVER WORTHY THE PROJECTS INVOLVED, AND DESPITE THE PROVISION OF NEW GENEROUS TAX INCENTIVES.

A LITTLE OVER HALF OUR PRIMARY ENERGY FINDS ITS WAY TO CONSUMERS THROUGH THE ELECTRIC AND GAS UTILITIES, AND THE UTILITIES ARE REGULATED, PRICE-CONTROLLED INDUSTRIES, SELLING THEIR PRODUCTS NOT AT FREE MARKET PRICES, BUT AT CONTROLLED PRICES WELL BELOW REPLACEMENT COST. BOTH THESE REGULATED INDUSTRIES HAVE RELATIVELY WEAK INCENTIVES TO SPEND ON R&D. IN ADDITION, SOME ENERGY-RELATED

INDUSTRIES ARE TOO FRAGMENTED TO ORGANIZE AND FINANCE A STRONG R&D RESPONSE TO MARKET SIGNALS. AN EXAMPLE OF THIS CASE IS THE BUILDING INDUSTRY.

THE ADMINISTRATION HAS SHIFTED TOWARD RESEARCH WITH LONGER RANGE IMPACTS. ERAB DOES NOT QUESTION THIS SHIFT AS A GENERAL PROPOSITION AS LONG AS IT RECOGNIZES VALID EXCEPTIONS. INDEED, PRIVATE INDUSTRY IS NOT LIKELY TO UNDERTAKE LONG-RANGE HIGH-RISK R&D. IT IS ALSO THE AREA IN WHICH ENERGY R&D CAN EXPECT THE HIGHEST PAYOFFS AND ADDRESSES THE GREAT NATIONAL ENERGY OBJECTIVES -- AFFORDABLE AND ENVIROMENTALLY BENIGN SOURCES OF ELECTRICITY AND FLUID FUELS, USED EFFICIENTLY, FOR THE INDEFINITE FUTURE.

ERAB IN ITS EVALUATIONS OF PROGRAMS TOOK THE NEW POLICIES AND GUIDELINES RELATIVE TO THE FEDERAL ROLE VERY SERIOUSLY, BUT ERAB HAS MADE EXCEPTIONS WHERE THERE IS REASONABLE CERTAINTY THAT TIMELY AND ADEQUATE RESPONSE BY INDUSTRY AND COMMERCE IS AN UNREALISTIC ASSUMPTION, AND THAT CONTINUED FEDEARL RESEARCH SUPPORT IS THEREFORE STILL REQUIRED, AT LEAST FOR A TIME.

VI. OBSERVATIONS ABOUT THE FEDERAL ADVISORY PROCESS

THERE ARE A NUMBER OF IMPORTANT STRENGTHS AND LIMITATIONS IN THE ADVISORY PROCESS THAT IMPACTED OUR EFFORTS TO ADVISE THE SECRETARY ON ENERGY R&D PRIORITIES. AS YOU KNOW, FEDERAL ADVISORY COMMITTEE REGULATIONS REQUIRE THAT THE MEMBERSHIP REPRESENT THE BALANCE OF VIEWPOINTS AND THAT MEETINGS ARE OPEN TO THE PUBLIC. THE BOARD'S MEMBERSHIP (LISTED IN THE REPORT) INCLUDES A WIDE SPECTRUM OF VIEWS WHICH NOT ONLY INSURES MANY SPIRITED DEBATES BUT ALSO INDEPENDENT ADVICE THAT IS NOT ALWAYS IN CONCERT WITH THE ADMINISTRATION. IN ACCORDANCE WITH THE FEDERAL ADVISORY COMMITTEE ACT (FACA) RULES A VERY REAL EFFORT HAS BEEN MADE TO INCLUDE THE REQUIRED VARIETY OF VIEWPOINTS IN ERAB.

THE STRENGTH OF THIS PROCESS IS IN PROVIDING THE INDEPENDENT JUDGMENT OF A DIVERSE GROUP OF OUTSIDE EXPERTS. ON THE OTHER HAND, THE BOARD DOES NOT HAVE THE BENEFIT OF TIMELY ACCESS TO ALL BUDGETARY AND TECHNICAL INFORMATION NOR INTERNAL DELIBERATIONS OF THE DEPARTMENT ON R&D POLICY BEFORE THE FACT. THUS, THE LIMITATION OF THE ADVISORY PROCESS IS IN KEEPING PACE WITH POLICY DEVELOPMENTS IN ORDER TO PROVIDE TIMELY AND RELEVANT ADVICE.

IN AN EXCEPTION TO THE FEDERAL ADVISORY COMMITTEE ACT, THE DOE ACT ONLY ALLOWS OUR MEETINGS TO BE CLOSED FOR TWO OF THE FEDERAL ADVISORY COMMITTEE ACT/FREEDOM OF INFORMATION ACT PROVISIONS, SO WE CANNOT RECEIVE INTERNAL INFORMATION.

IN THIS REGARD, I DRAW YOUR ATTENTION TO A RECENT REPORT OF THE CHARLES F. KETTERING FOUNDATION TITLED FEDERAL ADVISORY COMMITTEES: AN IMPORTANT FRUSTRATION WHICH RAISES IMPORTANT ISSUES REGARDING

THE INTEGRITY AND UTILITY OF THE ADVISORY PROCESS. I WOULD ALSO CALL YOUR NOTICE TO A 1978 REPORT OF THE NATIONAL RESEARCH COUNCIL OF THE NATIONAL ACADEMY OF SCIENCES: PRIVATE SECTOR PARTICIPATION IN FEDERAL ENERGY RD&D PLANNING. THAT REPORT EXPLORED IN SOME DETAIL THE COMPLEXITIES AND CONSTRAINTS THAT INHIBIT THE FEDERAL ADVISORY COMMITTEE PROCESS AND RECOMMENDED THE ESTABLISHMENT OF A FORMAL ADVISORY BOARD REPORTING TO THE SECRETARY OF ENERGY. THREE MEMBERS OF THE PRESENT ERAB, INCLUDING MYSELF, SERVED ON THAT NAS/NRC COMMITTEE.

THESE REPORTS UNDERSCORE SEVERAL MAJOR IMPEDIMENTS TO THE FEDERAL ADVISORY PROCESS THAT MERIT SOME SERIOUS ATTENTION IN CONGRESS. THERE IS A CLEAR NEED TO IMPROVE THE PROCESS OF SCIENCE AND TECHNOLOGY ADVICE IN PROVIDING TECHNICAL INFORMATION AND JUDGMENT TO THE GOVERNMENT.

THIS CONCLUDES MY SUMMARY OF OUR CONCLUSIONS. I WOULD REQUEST THAT THE FULL TEXT OF MY PREPARED STATEMENT AND THE FOUR APPENDED DOCUMENTS BE ENTERED INTO THE FORMAL RECORD OF THIS HEARING. I WOULD BE HAPPY TO ANSWER ANY QUESTIONS YOU MAY HAVE REGARDING OUR REPORT.

Department of Energy
Washington, D.C. 20585

20 October 1981

Mr. Louis H. Roddis
Chairman
Energy Research Advisory Board
110 Broad Street
Charleston, SC 29401

Dear Mr. Roddis:

The National Energy Policy Plan, recently submitted by the President to Congress, recognizes the importance of energy conservation. Although the Plan emphasizes the role that the private market will play, it notes that in some limited circumstances the Federal Government must support the activities of the private sector. Defining the proper Federal role in line with the energy needs of the country and the budget constraints must be a major focus in the development of the Department's approach to energy conservation.

I would like the Energy Research Advisory Board to look closely at how the Administration can best combine the strengths of private enterprise with the support of the Federal Government in all energy technologies. In its deliberations, the Board should consider the more efficient use of energy as opposed to curtailment of desired services. In this regard, I would appreciate the Board's advice and recommendations for action on the following items:

- Research and development activities in energy conservation that should be pursued by the Federal Government
- The Federal Government's capability as a consumer of energy to conduct R&D in an effort to improve its own use of conservation technologies
- Institutional restraints and market structures that prevent energy prices from calling forth an appropriate marketplace response in efficiency improvements, and
- How the ability and incentive of the various sectors of our economy to conduct effective conservation research both on manufacturing processes and final products can be improved.

The results of this study will be particularly useful to the Department as it reviews its conservation programs during the coming year. I would appreciate receiving the Board's report by April 15, 1982.

Sincerely,

Ken

Deputy Secretary

CONSERVATION PANEL
OF THE
ENERGY RESEARCH ADVISORY BOARD
January 1982

Thompson, Grant (Chairman)*
Senior Associate
Conservation Foundation
1717 Massachusetts Avenue, N. W.
Washington, DC 20036
(202) 797-4300

ERAB Staff
Gant, Mary M. (Executive Secretary)
Snodderly, Joan
Energy Research Advisory Board
Forrestal Building, ER-6
Washington, DC 20585
(202) 252-8933

Membership

Bahnfleth, Donald R.
Treasurer, ASRAE
Ziel-Blossom and Associates
23 East Seventh Street
Cincinnati, Ohio 45202
(513) 421-3363

Bleviss, Deborah
Associate Director
Federation of American Scientists
307 Massachusetts Avenue, N.E.
Washington, DC 20002
(202) 546-3300

Brinch, Jan
Consultant
Association of Idaho Cities
3314 Grace Street
Boise, Idaho 88703
(208) 344-8594

Chenea, Paul F.
Vice President
General Motors Research Laboratories
4722 Heather Lane
Birmingham, MI 48010
(313) 851-5639

Cochran, Thomas*
Senior Scientist
Natural Resources Defense Council
1725 I Street, N.W.
Suite 600
Washington, DC 20006
(202) 223-8210

Decker, Gerald L.
Vice President & Director of Energy
Kaiser Aluminum & Chemical Co.
300 Lakeside Drive
Oakland, CA 94643
(415) 271-3922

Kamo, Roy (Mail Code 50165)
Executive Director
Advanced Program Development
Cummins Engine, Inc.
Box 3005
Columbus, IN 47201
(812) 379-5591

Landsberg, Hans*
Senior Fellow
Resources for the Future
1775 Massachusetts Avenue, N.W.
Washington, DC 20036
(202) 328-5000

Schelling, Thomas
Professor of Political Economics
Kennedy School of Government
79 Boylston Street
Cambridge, MA 02138
(617) 495-1185

Socolow, Robert
Director, Center for Energy &
Environmental Studies
Engineering Quad D-329
Princeton University
Princeton, NJ 08540
(609) 452-5446

Willrich, Mason
Vice President, Corporate Planning
Pacific Gas & Electric Co.
77 Beale Street, #2955
San Francisco, CA 94106
(415) 781-4211 x4185

* ERAB Member

Federal Energy R&D Priorities

REPORT OF THE
ENERGY RESEARCH ADVISORY BOARD

November 1981

Department of Energy
Washington, D.C. 20585

December 4, 1981

Honorable W. Kenneth Davis
Deputy Secretary of Energy
1000 Independence Avenue, SW
Washington, DC 20585

Dear Ken:

I am pleased to forward the Report of the Energy Research Advisory Board on Federal Energy RD&D Priorities. This report was prepared in response to your request on August 13, 1981, to review the relative merits of each major R&D program.

The Board is in full agreement that the Federal Government must continue to support research and development for the technologies upon which the nation's energy future depends. Although all the members (except for Philip Handler) participated in the development of this report and reached a consensus on most recommendations, there are a few statements that represent majority opinions where every member did not agree to every statement. Dissenting views on those recommendations for which overall agreement was not possible are included in the Appendices.

Sincerely,

Louis H. Roddis, Jr.
Chairman
Energy Research Advisory Board

Enclosure

cc:
Thomas J. Kuehn, ERAB
Joel Snow, ER-4

Department of Energy
Washington, D.C. 20585

December 4, 1981

Louis H. Roddis, Chairman
Energy Research Advisory Board
110 Broad Street
Charleston, SC 29401

SUBJECT: Letter of Transmittal of the R&D
Panel RD&D Priorities Report

Dear Lou:

This letter transmits to you the RD&D Priorities Report. The report contains inputs from all members of the Board, and except where minority views are presented, there is general agreement with its contents.

As you know, the methodology required members of the Panel to evaluate each R&D program in terms of a specific set of criteria. The evaluations were combined to arrive at composite figures of merit which were then reviewed and discussed by the R&D Panel. At the outset of this project, there was some uneasiness about the validity of the evaluation methodology. To guard against possible difficulties, each section of the report, after drafting by two members of the Panel, was reviewed and discussed thoroughly by the full Panel before final judgments were made.

The preparation of this report in such a short time was a formidable task. In my view, the Board did remarkably well to complete this study on time.

Sincerely,

John S. Foster, Jr.
R&D Panel Chairman

4094A

FEDERAL ENERGY R&D PRIORITIES

I. EXECUTIVE SUMMARY 1

II. INTRODUCTION

A. Background and Purpose 4

B. Energy Policy Context of R&D: "The Federal Role" 5

C. Methods and Criteria 8

III. ENERGY PROSPECTS

A. Supply and Demand Projections 9

B. Energy R&D Budget Analysis 14

C. Energy R&D Balance and Timing 14

IV. ELECTRIC-RELATED SUPPLY PROGRAMS

A. Introduction 18

B. Near Term Nuclear Programs 18

C. Long Term Nuclear Programs 19

D. Non-Nuclear Electric Programs 21

V. FUELS SUPPLY TECHNOLOGY

A. Introduction 23

B. Synthetic and Natural Gas 23

C. Petroleum and Synthetic Liquids 25

D. Biomass and Solid Fuels 27

E. Advanced Research and Environmental Control Research . . 27

VI. UTILIZATION AND CONSERVATION TECHNOLOGY

A. Introduction 29
B. Conservation Programs 29
C. Solar Programs 32
D. Other End-Use Technologies 33

VII. SCIENCE AND TECHNOLOGY BASE

A. Introduction 35
B. General Science 35
C. Energy Supporting Research. 37
D. Environmental Research 39
E. Federal Role and the Energy Technology Base 40

VIII. CONCLUSIONS AND RECOMMENDATIONS CONCERNING ENERGY R&D PRIORITIES

A. Overall R&D Program Priorities 41
B. Electric Supply R&D Programs 43
C. Liquid and Gas Supply R&D Programs 44
D. Conservation and Utilization R&D Programs 45
E. Science and Technology Base Programs 46
F. General Conclusions and Recommendations 46

APPENDICES

APPENDIX A: Charge Letters

1. Letter from Deputy Secretary Kenneth Davis, August 13, 1981
2. Letter from Deputy Secretary John Sawhill, April 30, 1980

APPENDIX B: Background Information

1. Chronology of R&D Panel meetings
2. Budget summary
3. Timing of program impact

APPENDIX C: Description of Methodology

1. Overview
2. Criteria for evaluating programs

APPENDIX D: Dissenting Opinions

R&D PANEL

Chairman

John S. Foster
Vice President for Science and Technology
TRW, Inc.
Cleveland, OH 44177

Vice Chairman

William McCormick
Executive Vice President
Michigan-Wisconsin Pipeline Co.
American Natural Resources System
Detroit, MI 48226

MEMBERSHIP

Ivan L. Bennett
Dean and Provost
New York University Medical Center
New York, NY 10016

Herman R. Branson
President
Lincoln University
Pennsylvania 19352

Solomon J. Buchsbaum
Executive Vice President
Customer Systems
Bell Laboratories
Holmdel, NJ 07733

Melvin Calvin
Professor of Chemistry
University of California
Berkeley, CA 94720

Dayton Clewell
Senior Vice President (Retired)
Mobil Oil Corporation
Darien, CT 06820

Thomas B. Cochran
Senior Staff Scientist
Natural Resources Defense Council
Washington, DC 20006

James C. Fletcher
University of Pittsburgh
Pittsburgh, PA 19352

Norman Hackerman
President
Rice University
Houston, TX 77001

Philip Handler
President (Retired)
National Academy of Sciences
Woods Hole, MA 02543

Charles J. Hitch
President Emeritus
University of California
Berkeley, CA 94720

Hans H. Landsberg
Senior Fellow
Resources for the Future
Washington, DC 20036

William S. Lee
President and Chief Operating Officer
Duke Power Company
Charlotte, NC 28242

ERAB R&D PANEL (continued)

Martin A. Elliott
Consultant to Texas Eastern
Transmission Corporation
Houston, TX 77079

Eric H. Reichl
President (Retired)
Conoco Coal Development Company
Greenwich, CT 06836

Louis H. Roddis
Consulting Engineer
Charleston, SC 29401

Roland W. Schmitt
Vice President
Corporate Research & Development
General Electric Company
Schenectady, NY 12301

David Pimentel, Professor
Department of Entomology and
Section on Ecology & Systematics
Cornell University
Ithaca, NY 14850

John W. Simpson
Consultant to International
Energy Associates, Ltd.
Hilton Head, SC 29928

Grant P. Thompson
Senior Associate
The Conservation Foundation
Washington, DC 20036

Victoria J. Tschinkel
Secretary
Department of Environmental
Regulation
State of Florida
Tallahassee, FL 32301

STAFF

James M. Williams
Executive Secretary
ERAB R&D Panel
Los Alamos National Laboratory
Los Alamos, NM 87545

Thomas J. Kuehn, Executive
Director
Energy Research Advisory Board
Department of Energy
Forrestal Building, ER-43
Washington, DC 20585

FEDERAL ENERGY RD&D PRIORITIES

I. EXECUTIVE SUMMARY

Background

In a letter dated August 13, 1981, the Deputy Secretary of Energy asked for the advice of the Energy Research Advisory Board (ERAB) on DOE's R&D priorities and on "hard choices" the Department must soon make as to "which programs to pursue vigorously and which to de-emphasize based on a realistic appraisal of both our energy options and energy needs for the foreseeable future." This report of ERAB responds to that request in the context of continuing pressure for further reductions in DOE's budget. This report presents recommendations on priorities within DOE's non-defense R&D program and suggests where funding should be changed, either increased or decreased relative to the President's FY 82 budget request.

During the last year, major changes in policy have been made; these have already led to changes in DOE's objectives, strategies, R&D funding and internal allocations of R&D funds. In carrying out its study of DOE's R&D priorities, the ERAB has generally accepted these new policies and has confined its recommendations to matters of science, technology and engineering. In some areas, however, particularly in electric supply and conservation, the ERAB's application of these policies has resulted in somewhat different conclusions than those reflected in the President's FY82 budget. Moreover, the application of these policies has led to recommendations by the ERAB that differ significantly from those it made to the Secretary of Energy on September 5, 1980 in the interim report on research and development needs in which the Board applied funding policies of the previous administration.

Recommendations of this study resulted from application of both a new assessment methodology developed by the R&D Panel of ERAB and more conventional and traditional evaluation techniques. The new methodology required Board members to evaluate each R&D program in terms of a specific set of well defined criteria. This insured that each program was evaluated comprehensively by each member. The evaluations of all R&D Panel members were then combined numerically. These composite evaluations were then used as the basis for more traditional judgments, discussions and consensus building, leading to conclusions and recommendations by the Board. The salient findings of the Board are:

- Funding relative to the President's FY82 budget request for the science and technology base programs should be increased in some programs and remain the same in others. Within these programs high priority should be given to:

- research on the phenomena governing accumulation of CO_2 in the atmosphere from combustion of fossil fuels, climatic effects of this accumulation, tolerable levels of CO_2 and ways to control CO_2 accumulations

- research into acid rain, its causes, effects and control technologies

- In the electric supply sector, priority should be given to supporting:

  - nuclear waste isolation research and demonstration
  - conventional reactor systems and safety
  - the LMFBR base program
  - uranium enrichment R&D

- Programs in which reductions can be made include:

  - small reductions in magnetic fusion

  - significant reductions in the Clinch River breeder,* the light water breeder, electricity transmission, and high temperature geothermal

  - phase-out of funding for hydropower and magnetohydrodynamics

- The Board noted that the electric supply technology is receiving a fraction of DOE's funding that is substantially in excess of its contribution to present and future energy supplies.

- In fuels supply technologies, the Board believes that technologies such as enhanced oil and gas recovery, while urgent because of near term benefits, will be adequately supported by the private sector. DOE's support of these programs can thus be reduced. The Board also recommends that:

  - the major Federal effort in synthetic fuels research and development be directed at innovative concepts at the laboratory and small pilot-plant scale. In view of the financial guarantees available from DOE and the Synfuels Corporation, DOE's budget for cost-shared projects at the large pilot plant and demonstration-plant scale and for in situ shale recovery should be reduced.

---

*See dissenting opinion and additional remarks in Appendix D.

- the funding level for R&D directed at producing liquids and gases from biomass and the production of alcohol is at an appropriate level.

- ERAB urges that the parts of Advanced Research and Environmental Control Technology R&D (FE) concerned with technologies to control SO_x, NO_x and particulates emissions be increased and strengthened at the expense of other activities in this program.

- On an overall basis within the Department of Energy, R&D funding for energy conservation and end-use technology is underfunded, particularly when compared with funding levels for supply technologies. A balance that better reflects the opportunities, importance, and nature of the Federal role in supporting private sector response needs to be achieved. This should be achieved by increases in funds allocated to buildings and community systems and industrial conservation.

- The Board believes that if its recommendations are implemented, a net reduction in DOE's budget will result.

II. INTRODUCTION

A. Background and Purpose

On April 30, 1980, the Deputy Secretary of Energy* requested that the Energy Research Advisory Board (ERAB) participate in the Department's review of the technology base component of its R&D programs by addressing the following concerns:

- The adequacy of the research underpinning for technology development programs
- Possible gaps or duplications of effort
- The balance among research performers in the universities, laboratories, and industry
- Significant R&D opportunities that our programs may be missing.

As a result of more than 16 public meetings during July and August 1980, a report was prepared by an R&D Panel and seven subpanels covering each of the major DOE program areas. This report titled, *R&D Needs in the Department of Energy*, was submitted to the Secretary of Energy on September 5, 1980, and recommended enhanced funding for a number of DOE program areas.

In the original request for an R&D study by ERAB, the Deputy Secretary expressed the view that this project should be a continuing effort through which ERAB would assist the Department in its R&D program evaluations. After the publication of the interim report, several members of the original panel continued to review various methodologies for evaluating R&D programs. On August 13, 1981, the Deputy Secretary* requested ERAB's recommendations on overall Federal energy R&D priorities specifically including the following concerns:

- The relative merits of each major R&D program with respect to such criteria as the technical and economic potential, urgency and lead time required, benefits and costs of Federal funding, contribution to energy security, health and environmental risks, and the appropriate Federal role;
- The appropriate R&D funding balance between electric power supply, fuels supply conservation, and technology base program areas;

---

*See Appendix A.

- The appropriate program orientation and balance between research, development, and demonstration activities;

- The strategic R&D objectives for the near, mid, and long term.

In September 1981, the R&D Panel was restructured to include all members of ERAB who contributed individually to the evaluation of 49 program areas covering all energy R&D programs. The Panel met on September 24, 1981, to discuss the results of their evaluations (see Appendix B for details on methods and criteria) and to reach a consensus on its recommendations for R&D priorities. The R&D Executive Committee met on October 30, 1981, to revise the draft report before it was discussed and the body of the report approved by ERAB at its November 4-5, 1981 meeting.

In these times of budgetary restraints, it is imperative that maximum effectiveness be attained in the use of Federal R&D funds. It is essential that a rational basis for evaluating priorities and the proper balance of funding be used to allocate increasingly scarce fiscal resources. The purpose of this assessment is to provide the Secretary of Energy with ERAB's best advice toward the accomplishment of that goal. The ERAB devised a methodology for structuring the discussion of RD&D priorities and relative funding levels for energy RD&D. A brief description appears in section II.C.

B. Energy Policy Context of R&D: "The Federal Role".

Between our 1980 study and the present one a new Administration has re-defined the appropriate role of Federally-sponsored energy R&D. Differences in our conclusions and recommendations from the earlier study result to a considerable extent from this redefinition and our adherence to it -- with certain exceptions noted below.

The previous Administration defined an expansive role for Federally-sponsored R&D, including demonstration and commercialization. The new Administration, by contrast, proposes to:

- Drastically shift the emphasis from Federal sponsorship to reliance on the private sector. With few exceptions this includes total reliance on the private sector for demonstration and commercialization.

- Limit appropriate Federally-sponsored R&D to: 1) Basic energy science and technology base; 2) Energy R&D of a long-term high-risk character; and 3) Research on the health, safety, and environmental aspects of energy supply and use.

- Strive to reduce Federal expenditure and the Federal deficit.

ERAB's deliberations have reflected an expectation that Federal funds for R&D will be stringently limited for the foreseeable future. In evaluating R&D programs ERAB has conformed generally but not slavishly to this policy. We applaud greater reliance on the private sector whenever possible. We applaud the restoration of a free market in petroleum. ERAB believes that much, perhaps most, of new energy supplies and greater efficiency in energy use will in fact be achieved by higher energy prices. But ERAB is concerned that some energy R&D of great potential significance for the achievement of the Nation's energy goals will fall between Federal and industry responsibilities.

The new policy recognizes that private industry cannot be expected to do basic energy research or projects of a long term, higher risk character. But there are other circumstances in which it would be unrealistic to expect timely and effective assumption by industry of R&D responsibilities abdicated by the Government, however worthy the projects involved, and despite the provision of new generous tax incentives. Some of these circumstances are discussed below.

Some of the markets on which energy is sold are not "free." Oil and coal are the exceptions. A little over half our primary energy finds its way to consumers through the electric and gas utilities, and the utilities are regulated, price-controlled industries, selling their products not at free market prices, but at controlled prices well below replacement cost. The consequences are that consumers of gas and electricity have less of an incentive to conserve (and therefore to undertake research on conservation) and that producers of electricity are so strapped financially that they cannot afford conventional additions to capacity, let alone demonstration projects or any expensive R&D. Gas producers are faring somewhat better and can look forward to eventual decontrol at the well head, but gas transmission and distribution will remain under control indefinitely and so presumably will the investor-owned electric utilities.

Both these regulated industries have weak incentives to spend on R&D. If successful, the benefits go to rate payers; if unsuccessful, the expenditure may be disallowed as "imprudent." In the case of electricity (but not gas) a substantial amount of R&D has been undertaken by large research-oriented equipment suppliers. And during the past decade the "invention" of a device for financing industry-wide R&D by rate payer levies through EPRI and GRI has enhanced the ability of both industries to respond to R&D needs and provided an alternative to some government-sponsored R&D, but the total annual budgets of the two institutions (less than $300M and $100M respectively) are far too small to permit them even to contemplate financing demonstration or first-of-a-kind commercial plants at a billion or more each.

Some energy related industries are too fragmented to organize and finance a strong R&D response to market signals. Individual units lack the financial strength, and realize too well that the benefits would accrue mainly to other units. Before the advent of agribusiness, the tremendous gains in agricultural productivity resulted from government and government-supported university research and an extension network to convey the results of the research to individual farmers. The building industry, to take an important example, is now similarly fragmented and similarly incapable of organizing and funding its own research.

Even where some larger units exist, industries with a strong R&D orientation and capability are the exception in America. Most of our industry-sponsored R&D is now highly concentrated in a few industries. The reasons may be historical, institutional, or adventitious. A strong R&D response to price signals requires both motivation and capability. In many cases the capability is simply lacking, and while it can be developed given time, the time required to build a strong research organization is measured in years.

A common reason for no response or inappropriate response by consumers to market signals is ignorance. EPA ratings of the fuel efficiency of automobiles, however faulty, focused attention on the potential savings and gave buyers useful guidance. The effect on the average fuel economy of new cars has been dramatic. In the case of buildings, particularly their heating and cooling, ignorance still reigns supreme. Almost no one knows what is cost effective at different prices, or where to go to get reliable, objective information. Almost no one knows how much reduced ventilation in super insulated buildings is safe or how to reconcile tightness and safety. The retrofit problems are extremely complex, and even the best "house doctors" are only beginning to learn their job. In the meantime we are consuming more energy in heating and cooling residential and commercial buildings than in running our automobiles, and the potential savings are also greater. The government can provide some of the research needed to achieve them.

To conclude: ERAB in its evaluations of programs has taken the new policies and guidelines relative to the Federal role very seriously, but ERAB has made exceptions where there is reasonable certainty that timely and adequate response by industry and commerce is an unrealistic assumption, and that continued Federal research support is therefore still required, at least for a time.*

---

*We have not, in this report, responded to the Deputy Secretary's request for advice on the respective roles of industry, university, and national laboratory R&D efforts. This will be a major focus of our new study on DOE laboratories, initiated on November 3, 1981.

C. Methods and Criteria

This assessment features an evaluation technique in which each member of ERAB evaluated 49 program areas covering all DOE energy R&D programs in terms of seven criteria for energy supply and conservation programs and five criteria for science and technology base programs. Each member evaluated the relative importance of these criteria and judged whether more, less, or the same amounts of money relative to the President's request for FY 1982 should be allocated to the various programs. The judgments of the Panel members were combined numerically to arrive at figures of merit for each program on the relative priorities of energy technologies and whether financial allocations to each program should be increased, held the same, or decreased relative to the President's request for FY 1982. The resulting figure of merit was used to rank the programs in order of importance.

Criteria used in evaluating the priority of each technology were selected and the definitions for each criterion agreed upon. The criteria for the R&D programs were technology potential, urgency, economic potential, benefit/cost, energy/national security, health/safety/environment, and federal RD&D role. The criteria for the Science and Technology Base programs were scientific potential, risk/benefit, mission impact, urgency and federal role. A more detailed definition of these criteria is given in Appendix C.

Each member of ERAB determined the relative importance of each criterion and then judged its importance for each technology. From this information normalized weighting factors for the criteria were determined. Using these factors and the criteria/technology judgement information, figures of merit were calculated for each technology. Recommended funding levels for each technology were also provided by ERAB members. This information was used as the basis for discussing recommendations of future funding — namely, whether the funding for each program should be decreased, remain the same or be increased relative to the President's FY82 budget request.

The results of this method allowed for a systematic, well structured debate on issues where the level of agreement was not clear or where clear disagreement was obvious. It was also quite effective in identifying areas of strong agreement by ERAB on a particular value judgment. It is important to note that the assessment or evaluation methodology which used decision questionnaires from each member was not intended to and did not "fix" the results of the final priority ratings. Rather the methodology was designed as an initial point of departure for discussion from which final conclusions would ultimately evolve — conclusions that were not necessarily consistent with the initial ratings. Where reasonable consensus could not be reached, the expression of minority views is included.

III. ENERGY PROSPECTS

A. Supply and Demand Projections

Table III-A shows the latest DOE projections* of U.S. energy consumption for 1990 and 2000 compared with actual consumption for 1980. Table III-B shows similar projections for U.S. energy production and net imports.

The most striking aspect of recent supply/demand projections has been the sharp drop, especially over the last two years, in the projections for total consumption of energy in the years 1990 and 2000. Figure III-1 illustrates the point. What lies behind this development are (1) a much stronger user response to rising energy prices than had been expected; i.e., greatly and steadily increasing efficiency in the use of energy, which has been expressed as a less than proportionate increase in energy consumption associated with a given increase in GDP, gross domestic product, (see Figure III-2), and (2) a substantial reduction in the expected rate of economic growth. This double-barreled assault on earlier projections has now reduced them to the equivalent of an annual growth between now and the year 2000 of about 1 Q/yr (equal to 0.5 MBD of oil, or 40-50 million tons of coal per year, or a trillion cubic feet of natural gas per year).

A second characteristic of energy consumption and production projections is that there remains a sizeable band of uncertainty. This is especially disconcerting where imported oil -- the country's Achilles heel -- is concerned. Imported oil is the principal balancing factor, and thus carries the combined impact of uncertainties in all other source projections. For this reason there is wide divergence in estimates of U.S. oil imports ten or twenty years from now. Table III-B shows a range from 4 to 15 Q/yr (2 to 7.5 MBD) in 1990 and from zero to 11 Q/yr (5.5 MBD) in 2000. There are estimates outside this range.

With few exceptions, current projections expect the completion of most nuclear plants now on the books, though opinions differ as to time of completion during the next two decades. Even if new orders are placed, this will barely, if at all, affect the number on stream for the balance of the century.

Expectations for coal- or shale-based gases and liquids are modest, with many observers judging the projection of the Synfuels Act of 4.2 Q/yr (2 MBD) in 1992 to be substantially unrealistic. Projections of solar energy (narrowly defined to exclude hydropower, biomass, etc.) are

---

*National Energy Policy Plan, USDOE, July 1981, DOE/PE-0029.

TABLE III-A

U.S. ENERGY CONSUMPTION
(Quadrillion Btu Per Year)

	ACTUAL	PROJECTED				% CHANGE
	1980	1990		2000		1980-20
		MIDRANGE	RANGE	MIDRANGE	RANGE	
Direct Oil[1/]	31.2	27	26-29	24	23-25	-23.0
Direct Gas[2/]	16.7	18	17.5-18.5	20	18-22	19.8
Direct Coal	3.5	5.5	5.0-6.4	7.5	6.6-8.2	114
Direct Renewable[3/]	1.8	2.7	2.6-2.8	4.2	3.9-4.5	133
Electricity	7.1	9.6	8.5-11	12	10-14	69
End-Use Consumption	60.3	63	59-67	68	62-74	
Conversion Losses*	17.7	24	21-27	32	28-36	
Total Consumption[4/]	78.0	87	80-94	100	90-110	

1/ Includes coal liquids.

2/ Includes synthetic gas from naptha and coal.

3/ Not included in conventional accounting.

4/ Range results from varying GNP assumptions.

*Includes conversion losses in generation and distribution of electricity and in production of synthetic fuels from coal and oil shale, but not similar conversion losses associated with other forms of energy, e.g. losses in petroleum refining and gas transmission.

Source: *National Energy Policy Plan*, USDOE, July 1981.

TABLE III-8

U.S. ENERGY PRODUCTION AND IMPORTS[1]
(Quadrillion Btu Per Year)

	ACTUAL	PROJECTED			
	1980	1990		2000	
		MIDRANGE	RANGE	MIDRANGE	RANGE
DOMESTIC PRODUCTION					
Oil and NGL	20.5	18	16-21	20.0	17-24
Conventional	20.5	16.4	14.7-19.1	13.7	11.1-18.1
Unconventional[2]	--	1.7	1.0-3.0	6.1	4.2-8.5
Natural Gas	19.8	18.5	16-21	18.0	14-21
Conventional	19.8	17.4	14.6-19.7	14.7	11.4-18.2
Unconventional[3]	--	1.3	1.0-1.6	3.3	2.0-5.1
Coal[4]	18.9	27	24-30	42	37-45
Nuclear	2.7	7.6	6.7-8.7	10.6	7.4-14.0
Hydro/Geothermal	3.2	3.6	3.3-3.9	4.3	3.7-4.9
Renewables[5]	1.8	2.8	2.4-3.3	5.4	3.9-7.0
Total Production[6]	66.9	78	68-88	100	83-116
NET IMPORTS					
Oil	13.3	10	4-15	3	0-11
Gas	1.0	2	1-3	2	1-3
Coal	(2.4)	(3.5)	(2.3-4.3)	(5.9)	(3.4-8.4)
Total Consumption[7]	78	87	80-94	100	90-110

---

[1] Ranges in production reflect uncertainties about US energy supply.

[2] Includes shale oil and incremental enhanced oil recovery, but excludes coal liquids.

[3] Includes unconventional gas production from tight sands, Devonian shale and geopressurized methane. Does not include synthetic gas.

[4] Includes coal production for synthetics and coal exports.

[5] Includes about 1.8 quads of biomass not currently included in EIA/DOE statistics.

[6] Totals may not add due to rounding.

[7] Includes 0.8 quads of net stock increases in 1980. Range in total energy consumption results from varying GNP assumptions.

Source: National Energy Policy Plan, USDOE, July 1981.

FIGURE III-1

TRENDS IN U.S. ENERGY DEMAND PROJECTIONS FOR THE YEAR 2000

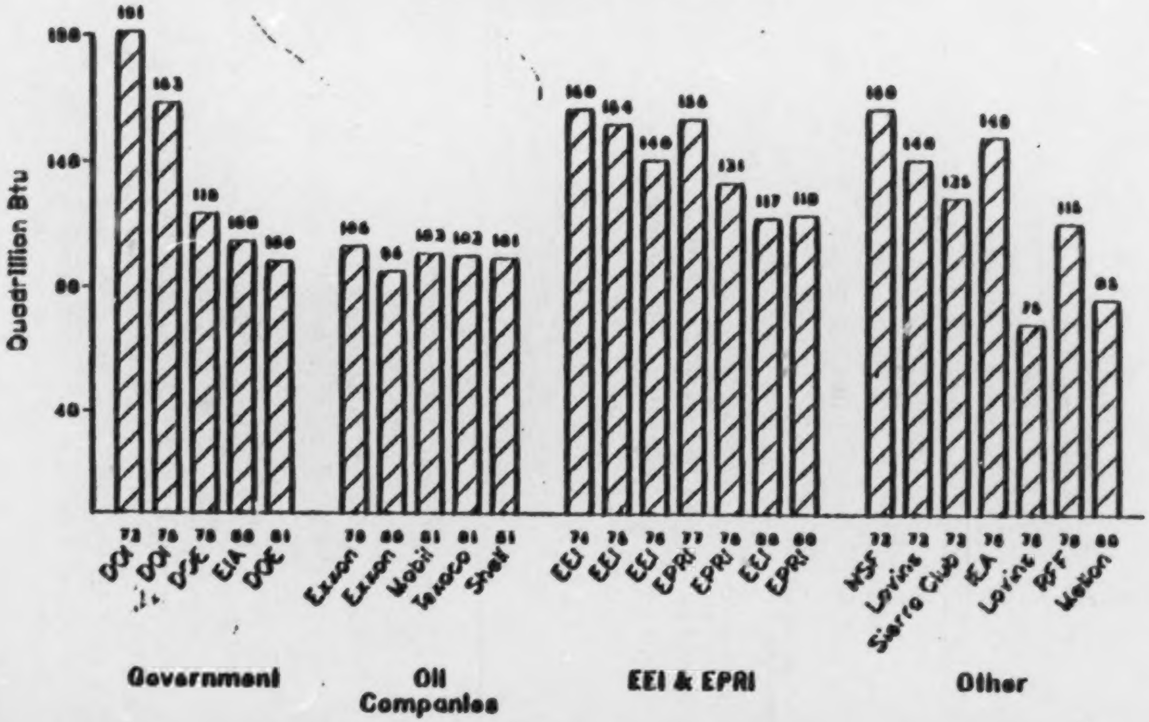
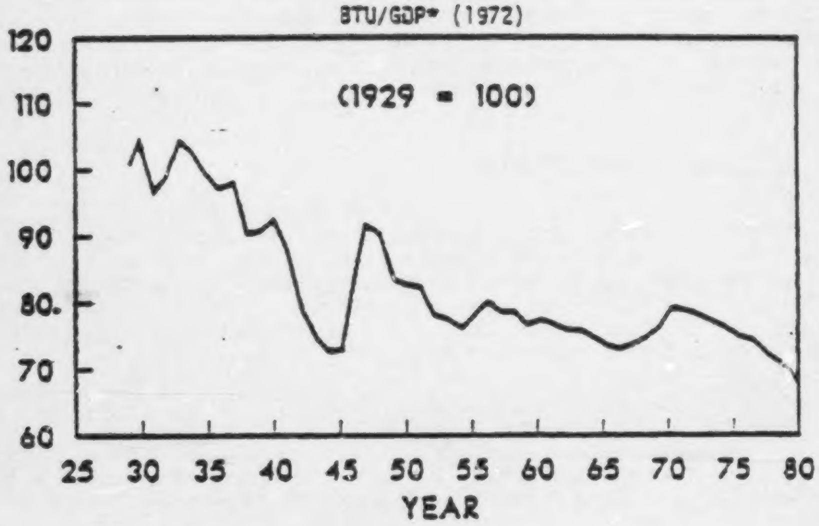


Figure III-2



*GDP represents gross domestic product

Source: Work in Process. Resources for the Future. Washington, DC: July 1981.

modest, largely connected with the continued depression in the consumer market, the cost of retrofitting and little progress in alleviation of institutional obstacles. Thus, for the next two decades oil, natural gas, and coal with a modest contribution of nuclear and an even more modest one of hydropower will remain the basic components of the U.S. energy supply.

Lest this quick sketch be interpreted as reflecting a mind-set of complacency, we should stress that a large number of assumptions may prove mistaken. These range all the way from the expected continuation of increased efficiency in use (i.e., how soon will that downward slope in the Btu/GNP ratio flatten out?) to the completion, more or less on schedule, of all nuclear plants now being constructed or having construction permits. Finally, a major perturbation in the oil import segment would play havoc with all projections.

B. Energy R&D Budget Analysis

Table III-C (FY1981) and III-D (President's proposals FY 1982) analyze the DOE budget by output energy form (electricity, fuels, and conservation) related to the resource base. Tables III-E and III-F analyze the budget by the same output energy forms related to the timing of impact: near term (next 10 years), mid term (1990-2010) and long term (beyond 2010). These tables are based on a categorization of programs selected by ERAB (see Appendix B-3).

C. Energy R & D Balance and Timing

Initial inspection of the FY 81 and FY 82 Federal energy R&D budgets (Tables III-C and III-D) reveals what appear to be imbalances in the program.

- There is very heavy stress on electrical technology in FY 81, further accented in FY 82, although it is noted that fluid fuels constitute our principal vulnerability.
- Similarly, within electricity, federally-sponsored nuclear programs are receiving a larger proportion of funding than the expected nuclear share of the U.S. energy mix during the next few decades.
- Finally, conservation, a very small fraction of the energy R&D budget in FY 81, is further and drastically reduced in FY 82, although it has so far contributed much more than supply augmentations in reducing our dependence on insecure oil imports.

TABLE III-C

FY 81 Budget as a Function of Technology Area and Energy Form, Millions of $

Output Energy Form / Resource Base	Electricity	Fuels	Utilization and Conservation	Science and Technology Base	TOTALS
Conservation	-	-	311.5	-	311.5 (7%)[9%]
Nuclear & Fusion	1793.1 *	-	-	-	1793.1 (39%)[50%]
Coal	66.6	492.4	37.4	-	596.5 (13%)[16%]
Solar	224.3	49.6	363.1	-	637.0 (14%)[18%]
Geothermal	153.6	-	-	-	153.6 (3%)[4%]
Oil/Gas/Shale	-	78.9	-	-	78.9 (2%)[2%]
Science and Technology Base	-	-	-	979.3	979.3 (22%)
TOTALS (% of Total) [% less science and tech base]	2237.6 (49%) [63%]	621.0 (14%) [17%]	712.0 (16%) [20%]	979.3 (21%)	4549.9 [3570.6]

*Centrifuge R&D costs included, construction costs excluded.

[] signify Science & Technology Base funding excluded.

TABLE III-D

President's FY 82 Budget as a Function of Technology Area and Energy Form, Millions of $

Output Energy Form / Resource Base	Electricity	Fuels	Utilization and Conservation	Science and Technology Base	TOTALS
Conservation	-	-	126.7	-	126.7 (3%)[5%]
Nuclear & Fusion	2022.2 *	-	-	-	2022.2 (53%)[72%]
Coal	-	282.4	38.8	-	321.2 (8%)[11%]
Solar	66.9	30.5	128.7	-	226.1 (6%)[8%]
Geothermal	46.8	-	-	-	46.8 (1%)[2%]
Oil/Gas/Shale	-	46.5	-	-	46.5 (1%)[2%]
Science and Technology Base	-	-	-	1073.4	1073.4 (28%)
TOTALS (% of Total) [% less science & tech base]	2135.9 (55%) [76%]	359.4 (9%) [13%]	294.2 (8%) [11%]	1073.4 (28%)	3862.9 [2789.5]

*Centrifuge R&D costs included, construction costs excluded.

[] signify Science & Technology Base funding excluded.

The questions whether these apparent imbalances are truly misallocations, or are justified, are addressed in detail in later sections of the report, and ERAB's recommendations for specific allocations within the overall budget are summarized in the conclusions at the end of the report.

No "correct" balance among energy forms and resources can be defined *a priori*: it would be absurd, for example, to assign coal or natural gas a "fair" share of Federal research dollars if there are no promising research projects in those areas which industry cannot be expected to undertake.

Tables III-E and III-F illustrate the Reagan administration shift toward research with longer range impacts. ERAB does not question this shift as a general proposition as long as it recognizes valid exceptions. Indeed, private industry is not likely to undertake long-range high risk R&D. It is also the area in which energy R&D can expect the highest payoffs and addresses the great national energy objectives -- affordable and environmentally benign sources of electricity and fluid fuels, used efficiently, for the indefinite future.

A summary of the timing impact of the various supply technologies used in preparing Tables III-E and III-F appears in Appendix B.

TABLE III-E*

FY81 Budget as a Function of Energy Form and Timing of Impact, Millions of $

	Near	Mid	Long	TOTALS
Electricity	827.2 **	539.6	870.8	2237.6 (49%)[63%]
Fuels	96.3	482.5	42.0	620.8 (14%) [17%]
Utilization and Conservation	509.2	203.0	-	712.2 (16%)[20%]
Science and Technology Base	-	-	979.3	979.3 (21%)
TOTALS (% of Total) [% less science & tech base]	1432.7 (31%) [40%]	1225.1 (27%) [34%]	[912.8][26%] 1892.1 (42%)	4549.9 [3570.6]

*The timeframe for impact of the various technologies used in making the above table is given in Appendix B.

**Centrifuge R&D costs included, construction costs excluded.

[] signify Science & Technology Base funding excluded.

TABLE III-F*

President's FY82 Budget as a Function of Energy Form and Timing of Impact, Millions of $

	Near	Mid	Long	TOTALS
Electricity	802.1 **	406.1	928.0	2136.2 (55%)[77%]
Fuels	60.7	274.0	24.4	359.1 (9%)[13%]
Utilization and Conservation	174.2	120.0	-	294.2 (8%)[10%]
Science and Technology Base	-	-	1073.4	1073.4 (28%)
TOTALS (% of Total) [% less science & tech base]	1037.0 (27%) [37%]	800.1 (21%) [29%]	[952.4][34%] 2025.8 (52%)	3862.9 [2789.5]

*The timeframe for impact of the various technologies used in making the above table is given in Appendix B.

**Centrifuge R&D costs included, construction costs excluded.

[] signify Science & Technology Base funding excluded.

IV. ELECTRIC-RELATED SUPPLY PROGRAMS

A. Introduction

Electric-related supply programs constitute \$2.1B of the FY 82 President's budget in energy supply R&D. Of this, \$2.0B is devoted to nuclear fission and fusion R&D. The programs classified under this heading are on average larger in size than those in other R&D categories. This is because programs involving nuclear fission and nuclear fusion necessarily involve large research teams and also frequently involve expensive equipment and facilities for demonstration projects. This applies whether the impact of the program is near term as in research on conventional reactor systems, or long term as in fusion research.

The extent to which these programs should be financed by the Federal Government rather than by private industry is regarded by ERAB members as a key criterion. In many programs the Federal Government has assumed responsibilities (uranium enrichment, nuclear waste disposal and nuclear safety) that are not now assumed by private industry. In other programs (e.g., magnetohydrodynamics, breeder reactors, magnetic fusion) the risk is presently too great and the time scale too long for substantial private industry funding. For such programs the key criteria for continued government funding are the chance of technical success and the ultimate potential for providing a secure energy supply.

A major shift in the Administration's Energy Policy has been to give increased support to assuring the viability of the light water reactor (LWR) electric power industry. In order to carry out this new policy, ERAB recommends that the Administration give high priority to:

- R&D in nuclear waste disposal, particularly in accelerating early demonstration of specific, most promising waste disposal methods
- R&D on current generation LWR's

The summary of ERAB conclusions on priorities and funding for electric related supply is given in Table IV-A.

B. Near Term Nuclear Programs

Conventional reactor systems (\$31.5/\$68.0)* Increased funding for R&D on conventional reactor systems is recommended. Increased funding should be concentrated in high pay-off areas -- Three-Mile Island analysis, high burn-up fuel, safety related research and lower enriched fuel for research reactors while high temperature gas reactor funding has a lower priority.

---

*FY81 funding/FY82 President's Request in million \$ are shown in parenthesis.

Nuclear waste programs ($499.8/$617.6) ERAB thinks that the proposed funding for these programs is satisfactory, even though they have the highest priority. Funding increases are not considered necessary because technology is regarded as available; the main obstacles are political. It is recommended that demonstration and site work should be accelerated. Safe waste disposal is critical for assuring the viability of the light water reactor cycle.

Uranium enrichment programs ($142.3/$149.7) There is strong agreement that funding for advanced isotope separation and advanced centrifuge R&D should be continued. It should be noted that $293.3M in FY81 funds and $695.8M in FY82 funds for construction of the near term gas centifuge capacity were excluded from consideration of R&D expenditures as the decision on this project should be based on normal payback criteria. In this regard, the ERAB recommends that consideration be given to formation of a quasi-government or private corporation to handle enrichment on a commercial basis.

Uranium resources assessment ($25.9/$5.8) The President's 1982 Budget for this program represents a substantial reduction from past plans. ERAB recommends that funding be continued at approximately the 1982 budget level so that gathering of readily accessible data and periodic publication of reports can be continued.

C. Long Term Nuclear Programs

Liquid metal fast breeder reactor (base program) and fuel cycle R&D ($419.4/413.9) It is considered desirable to maintain present levels of effort in the LMFBR base program and fuel cycle R&D, except those aspects that are closely tied to near term demonstration should be reviewed for appropriate changes. Breeders with attendant reprocessing could have a high ultimate impact on energy supply security. Although the ultimate impact is post-2000, ERAB recommends that this base technology program must be maintained.

Clinch River Breeder Reactor ($172.0/$254.0) The ERAB believes that the construction of a breeder reactor demonstration at this time is not an urgent priority and thus, under current budget constraints, recommends that such a demonstration be delayed until a future time.*

---

*See dissenting opinion and additional remarks in Appendix D.

TABLE IV-A

SUMMARY
R&D PRIORITIES
ELECTRIC SUPPLY PROGRAMS

RANK[1]	PROGRAM	PRIORITY[2]	President's FY82 Budget	ERAB Funding[2] Recommendation
1	Nuclear Waste Commercial (NE)	HIGHER	227.6	Same
2	Nuclear Waste Defense (DP)		390.0	Same
3	Conventional Reactor System (NE)	MEDIUM	68.0	More
4	Breeder Reactor Fuel Cycle R&D (NE)		26.1	Little Less
5	U E - Centrifuge (NE)[3]		64.5	Same
6	Liquid Metal Fast Breeder (NE) (Base Program)		387.8	Same
7	Solar Power Technology (CE)		19.4	Less
8	U E - Advanced Isotope Separation (NE)		85.2	Same
9	Magnetic Fusion (ER)	LOWER	456.1	Little Less
10	Light Water Breeder Reactor (NE)		58.0	Less
11	Uranium Resources Assessment (NE)		5.8	Same
12	Electric Energy & Storage Systems (CE)		47.5	Less
13	Hydropower (CE)		0.0	Zero
14	Clinch River Breeder Reactor (NE)		254.0	Less
15	Geothermal (CE)		46.8	Less
16	Magnetohydrodynamics (FE)		0.0	Zero

[1] Rankings represent consensus view of ERAB and should be interpreted with caution; the differentiation between any two consecutive programs is not necessarily significant.

[2] Priority reflects ERAB view of overall merit of program; funding recommendations relative to the President's budget request for FY82 reflect on Federal role.

[3] Excludes $695.8 million for centrifuge plant construction.

Light water breeder reactor ($60.2/$58.0) This program has the potential of extending the long-term supply of nuclear fuels. The ERAB agrees however that decreased funding for the LWBR may be warranted. The unattractive economics and the lack of industry interest are cited as reasons. Further reductions in funding are recommended.

Magnetic fusion ($391.0/$456.1) ERAB members agree on the long-term importance of this program and that the primary Federal role should be to continue to sponsor a joint program of the federal laboratories, industry and university scientific communities to determine if fusion can be practical.* The potential payoff is very large, but is much too far in the future for significant private sector support. There was agreement that a stretch-out of the program is possible if budgetary pressures demanded it, but maintenance of a substantial level of Federal R&D funding is judged to be essential. It is also recommended that an enhanced effort to examine the use of fusion for the breeding of nuclear fuels deserves consideration.

D. Non-nuclear Electric Programs**

Solar power technology ($112.1/$19.4) This technology area includes wind energy and Ocean Thermal Energy Conversion. (Photovoltaics is included under Solar Applications for Building in the conservation section.) Wind energy is regarded as the most technologically advanced and as having achieved commercial potential. Since there are no critical technical R&D problems preventing commercialization by industry, and since there is limited potential to be realized, the Board recommends less funding for this technology. In the case of OTEC, technical feasibility has been shown on a small scale, thus fulfilling the primary Federal role. The Board recommends that remaining funding should be used to facilitate the transition to industrial commercialization.

Hydropower ($2.4/$0.0) Technical success for small scale hydropower has been proved, and private industry is active (although it is noted that U.S. manufacturers of low-head hydro equipment are absent). Little, if any, R&D is needed; therefore, the Board recommends phase-out of funding. Investment tax and other credits are sufficient to commercialize this technology.

Magnetohydrodynamics ($66.5/$0.0) There are other technologies (such as combined cycle gas turbines) available for increasing the efficiency of large, central power generation stations that do not have the extreme temperature/erosion problems associated with the use of coal in MHD. For this reason the Board foresees little commercial demand for this technology and therefore concurs with the planned phase-out of this program. The Board recommends that existing government facilities be utilized by industry if they wish to pursue research in this area.

---

*See Report on the DOE Magnetic Fusion Program, prepared by the Fusion Review Panel of ERAB, August 1980.

**Dispersed electric and co-generation technology, direct coal combustion, and fuel cell programs included in Section VI.

Geothermal ($153.6/$46.8) Strong agreement that funding should be decreased is predicated upon the fact that private industry should be undertaking the development of the part of the resource that appears economic, and is in fact doing so. The program is also seen as having low impact on national energy supply. If a Federal geothermal program is continued, emphasis should be on low temperature process heat and completing the ongoing hot dry rock program, not on geopressured energy resources, where the technical risk appears high or geothermal electric where industry is capable of solving the remaining problems.

Electric Energy and Storage ($109.8/$47.5) This program consists of two parts, R&D on electricity transmission and distribution and R&D on energy storage. R&D on electricity transmission and distribution is regarded as essentially the responsibility of private industry. As a result, there is agreement that the overall program should decrease in such a way that at least some results can be obtained from programs now at the point of yielding valuable data. R&D on energy storage, however, is regarded as important; this part of the program should be strengthened. The Board supports direct participation of Federal electricity producing and marketing agencies in the Electric Power Research Institute as a mechanism for supporting R&D on utility-related needs.

V. FUELS SUPPLY TECHNOLOGY

A. Introduction

Fuel supply technologies represent approximately 9% of the President's total FY 82 budget for energy supply. This sector of energy supply is not as highly regulated as the electric energy industry and has historically developed these supplies with private resources. In general, ERAB concludes that the more urgent technologies, such as enhanced gas and oil recovery, can have an early impact in the market but that the Federal role is significantly less since private industry will develop these sources. Conversely, as discussed in Chapter VII, on the Science and Technology Base, the Federal Government has important roles to play in environmental research on accumulation of CO_2 in the atmosphere and on acid rain. Either of these problems has the potential for substantially limiting expanded use of fossil fuels.

Table V-A provides a summary of the relative priorities and recommended funding levels discussed is this section.

B. Synthetic and Natural Gas

Enhanced Gas Recovery ($30.6/$10.2)* Enhanced gas recovery is given a medium priority with respect to urgency, benefit/cost ratio, supply security and a high priority with respect to technical and economic potential and health and environment. Government funding of the program should be decreased because the private sector is conducting adequate research and development in these areas. Only low level government funding is needed to assist in the funding of some private sector experiments by small companies and to maintain government awareness of what is being accomplished.

Surface Coal Gasification ($69.6/$53.4) Gasification is the most important step in the conversion of coals to synthetic gases and liquids by almost every process and possibly even in the conversion to electricity. While private sector efforts here and abroad are very extensive a continued DOE effort is well justified. Specifically, DOE gasification R&D should concentrate on (a) exploration of new process concepts; (b) R&D on the various auxiliary steps such as evaluation and preparation of gasifier feeds from U.S. coals and raw gas clean-up systems.

Most importantly R&D towards closing the gaps in the knowledge of environmental issues related to gasification is not only important but a most appropriate area for government research.

---

*FY81 funding/FY82 President's request in million $ are shown in parenthesis.

TABLE V-A

SUMMARY
R&D PRIORITIES
LIQUIDS AND GAS SUPPLY PROGRAMS

RANK[1]	PROGRAM	PRIORITY[2]	President's FY82 Budget	ERAB Funding[2] Recommendation
1	Enhanced Oil Recovery (FE)	HIGHER	20.1	Less
2	Advanced Research and Environmental Control Technology (FE)	MEDIUM	94.5	Same
3	Enhanced Gas Recovery (FE)		10.2	Less
4	Coal Liquefaction (FE)		105.2	Less
5	Biomass Energy (CE)		20.5	Same
6	Surface Coal Gasification (FE)		53.4	Less
7	Mining R&D (FE)	LOWER	21.0	Less
8	In Situ Oil Shale (FE)		16.3	Less
9	Alcohol Fuels (CE)		10.0	Same
10	In Situ Coal Gasification (FE)		8.3	Less

[1] Rankings represent consensus view of ERAB and should be interpreted with caution; the differentiation between any two consecutive programs is not necessarily significant.

[2] Priority reflects ERAB view of overall merit of program; funding recommendations relative to the President's budget request for FY82 reflect on Feder role.

Since a very broad pilot and demonstration program is under way outside DOE (much of it abroad) the need for continued pilot plant operation is eliminated (example Bi-gas project). R&D elsewhere involves efforts on both air- and oxygen-blown gasifiers, thus a separate DOE program on air-blown (low-BTU) gasifiers appears redundant.

In view of the above, the Board concludes that a funding level somewhat below that proposed in the President's budget would be adequate.

In-Situ Coal Gasification ($10.0/$8.3) In-situ gasification has been attempted here and abroad for many decades but with limited success. One of the more interesting parts of this DOE program aims at gasification of coal in steeply dipping beds. Tests now underway should be completed during the next year. This is a unique application which can be evaluated at the end of the present program; if successful, further development can then be carried on by private sector sponsors with an interest in this type of coal deposit. With this exception, the in-situ coal gasification program has a low probability of a commercially viable success and can be phased out.

C. Petroleum and Synthetic Liquids

Enhanced Oil Recovery ($16.2/$20.1) ERAB gives enhanced oil recovery a very high priority with respect to technological and economic potential, benefit/cost ratio, urgency, supply security and health/environmental problems. However, the Board recommends that Federal funding, even though relatively small, be decreased. A small Federal expenditure can be justified only for some of the environmental research and to keep current with technical developments in the private sector. This recommendation stems from the considerable evidence that the larger energy companies have the ability, the know-how and the willingness to engage in sustained long-term R&D. Also, the oil companies have the financial strength to commercialize enhanced oil recovery processes without government financed demonstrations.

Coal Liquefaction ($277.0/$105.2) Commercially demonstrated coal liquefaction technology is currently available. This is based on the so-called "indirect" route. Large plants are now in operation abroad; a full size plant is under construction in the U.S. that will demonstrate the critical components. Although this plant is designed to produce synthetic natural gas, not liquids, some 4/5 of the total process sequence is identical with that required for liquids, specifically the gasification and gas purification. Improved processes for conversion of the resulting CO/H_2 mixtures to liquids are in the process of commercialization. Although the competitive route to coal based liquids, namely direct hydrogenation, was once considered superior, it has not been practiced for 35 years and now requires an extensive R&D and demonstration program if it is to become competitive. This is desirable to avoid reliance on a single technology. DOE has been engaged in coal hydrogenation for over ten years and has advanced the art to the point where the private sector can evaluate the merit of direct hydrogenation. At the present time, there is no unanimity on any inherent advantage of direct hydrogenation over indirect liquefaction although it should be more thermally efficient in principle.

Outside of DOE activities, the Synthetic Fuels Corporation is even now considering support of several commercial scale liquefaction projects. All of the foregoing has made it possible for DOE to begin phasing out the large scale pilot and demonstration hydrogenation projects that were intended to close the gap between indirect and direct liquefaction of coal. This should be done in a manner protecting the major investments in these projects which include the 200 ton/Day Exxon Donor Solvent Unit, the 250 ton/Day H-Coal Catalytic hydro unit and the 6000 ton/Day Solvent Refined Coal-I (SRC-I) demonstration project; in context with the latter it should be noted that real progress in coal hydrogenation (by any one of its many variants) will ultimately require a large commercial scale demonstration facility to resolve the difficult engineering problems. As a result, completion of the present design phase of SRC-I will serve to highlight the key difficulties on which future R&D should concentrate. It now appears that DOE will remain the key source of future R&D in direct liquefaction (hydrogenation). ERAB supports the continued effort in this area by DOE at the laboratory and small pilot plant scale with particular emphasis toward a broadening of the program to explore a wider range of technologies including 2-stage conversion based on carbonization or extraction with catalytic hydrocracking, new catalyst development, new solid/liquid separation.

DOE's intention to pursue development of improved indirect-liquefaction processes is not considered appropriate by ERAB, given the very extensive effort in the private sector; therefore, ERAB recommends elimination of this part of the liquefaction program.

In summary, ERAB recommends a reduced budget for coal liquefaction focusing on R&D in direct liquefaction area and particularly on R&D to resolve the environmental problems associated with this technology.

In-Situ Oil Shale ($32.2/$16.3) In-Situ Oil Shale is given a medium priority with respect to urgency, technical and economic potential, and benefit/cost ratio. Oil shale is given a high priority with respect to supply security. Since the rich shales will be used first and are concentrated in about a 600 square mile area in Colorado, special attention should be given to the environmental problems that will arise if commercial production rises to the level of one or two million barrels per day. Likewise, the infrastructure needed to support this level of production in such a small area needs study. The government has an important role to play with respect to both the environment and the infrastructure problems; the present funding should be focused on these problems.

The in-situ oil shale program is really only a minor variation of the process for exploiting the oil shale resource. Both subsurface retorting and surface retorting of shale is under active investigation by the private sector. Several companies are designing commercial facilities with the intention of producing oil from shale in the late 80's. There is no need for a government role in the development of the technology of recovery of oil from oil shale; Federal expenditures in this area should be eliminated.

D. Biomass and Solid Fuels

Biomass Energy* ($31.7/$20.5) and Alcohol Fuels ($18.0/$10.0) Both programs are given a high priority with respect to technical potential. Biomass is given a medium priority with respect to all other criteria. Alcohol fuels differ from biomass in that they have a lower priority with respect to economic potential, benefit cost/ratio, supply security and urgency. The Board recommends that these funding levels not be changed. Particular attention should be given to the conversion of lignocellulose to fuels.

Mining R&D ($40.2/$21.0) Coal mining is an area deserving of substantial attention and support of R&D by the Federal Government. Much of this work is conducted by agencies other than DOE.

The Board recommends that coal mining R&D be concentrated in one agency and that DOE/FE instead concentrate its efforts on innovative concepts, particularly for preparation of fine sized coal.

E. Advanced Fossil Energy Research

Advanced Research and Environmental Control Research ($95.8/$94.5)** The Board believes this program should be funded at its present level but with some redirection.

---

*Report of the Biomass Panel of the Energy Research Advisory Board, November 1981.

**For FY82 budget request $67.1 for advanced fossil R&D and $27.4 for environmental control technology development.

Advanced Research and Environmental Control Technology R&D (FE) includes, in addition to all exploratory R&D on coal conversion, research towards substitution of coal for oil and gas in direct combustion; this is an extremely important program since the vast majority of coal must be used as boiler fuel over the next several decades, both in existing and new units. Equally important is the development of improved emission control technology to reduce SO_x, NO_x and particulates in fluegas. The Board therefore urges that these parts of the Advanced Research and Environmental Control Programs be increased and given higher priority at the expense of other activities in this program. The remainder of the program is designed to provide technology base support to other fossil energy programs in such areas as materials, diagnostics, instrumentation, and applied research on new concepts and processes. This work is also important, but is longer range and should be closely coordinated with other technology base efforts.

VI. UTILIZATION AND CONSERVATION TECHNOLOGY

A. Introduction

Utilization and conservation technologies represent approximately 8% of the total FY 82 budget for energy research and development (see Tables III-C) divided 4% for utilization and 4% for conservation. The President's budget itself reflects severe budget cuts for these areas, up to 80% reductions over FY 81 in some cases.

Relative to their potential contributions to the solution of the near- and medium-term energy problems, there is an imbalance in the allocation of R&D funds between the conservation programs and those directed at supply. The budget needs a reordering of priorities to reflect better the opportunities that exist for efficiency improvements and the unique Federal role in conservation R&D.

ERAB's views on this point are reflected in the high priorities that members gave to conservation R&D: in the Board's ranking, three of the top five programs (and five of the top ten programs) of the entire Department's R&D projects were drawn from conservation/end-use R&D.

The priorities assigned to conservation and end use programs are summarized in Table VI-A.

B. Conservation Programs

Buildings and Community Systems ($53.0/$28.0)* ERAB ranked research on Buildings and Community Systems in the high priority range. Recognizing its importance to the energy problem as a whole and to the oil import problem particularly, the Board noted that private sector R&D in this area is rare because of the fragmented and undercapitalized nature of the industries involved. The efficiency improvements that can be made in existing structures are large, and no R&D capability exists within the remodeling or retrofit private sector. A Federal role is highly appropriate in this field; indeed, Federally-supported work at several of the National Laboratories, university centers, and elsewhere has been productive in product and design innovation and in transferring research results into the field quickly. The same is true of the consumer products work undertaken by these groups.

ERAB recommends that funding levels in this area be increased, emphasizing R&D that the private sector is not funding, while maintaining active R&D and technology transfer programs involving industry.

---

*FY81 funding/FY82 President's request in million $ in parenthesis.

TABLE VI-A

SUMMARY
R&D PRIORITIES
CONSERVATION AND UTILIZATION

RANK[1]	PROGRAM	PRIORITY[2]	President's FY82 Budget	ERAB Funding[2] Recommendation
1	Coal Combustion Systems	HIGHER	38.8	Same
2	Buildings and Community Systems		28.0	More
3	Industrial Conservation		0.0	More
4	Transportation Conservation	MEDIUM	37.0	Same
5	Solar Applications for Buildings		84.7	Same
6	Heat Engines and Heat Recovery		15.6	Same
7	Multi-Sectors Conservation		17.5	Same
8	Fuel Cells		28.6	Same
9	Solar Applications for Industry	LOWER	44.0	Less

---

[1] Rankings represent consensus view of ERAB and should be interpreted with caution; the differentiation between any two consecutive programs is not necessarily significant.

[2] Priority reflects ERAB view of overall merit of program; funding recommendations relative to the President's budget request for FY82 reflect on Feder role.

The Federal Energy Management Program will be one of the subjects of discussion by the Board's Conservation Panel. It is not an R&D program; its shortcomings appear to have little to do with budget levels.

Transportation Conservation ($102.1/$37.0) Transportation Conservation R&D ranks at the top of the medium priority group of R&D programs. ERAB recommends that the funding level remain the same.

R&D emphasis should shift from the automobile to the heavy freight truck sector. The vehicle propulsion technology development program should be transferred to industry in an orderly way; the market, driven by consumer preference and foreign competition, should determine the necessity for and the direction of this R&D, not the Federal government. Likewise, electric and hybrid vehicle R&D should be sharply reduced.* Alternative fuels utilization R&D should continue but with closer cooperation with potential ultimate users. The transportation systems utilization activities deserve firm support. This program includes work that the private sector either will not do on systems improvements or cannot provide candidly.

Multi-Sector Conservation ($25.8/$17.5) The Multi-Sector Conservation program historically has been made up of three elements: the small inventions program, the appropriate technology program, and the Energy Conversion and Utilization Technology (ECUT) program. The President's budget has eliminated the appropriate technology program, but kept portions of the other two activities.

Even though it is required by legislation, the inventions program deserves relatively less emphasis within the Department; money devoted to it could be more productively used in the ECUT program, particularly if that program is restructured along the lines the Board recommends.

ECUT now devotes a major share of its budget to research on understanding combustion phenomenon, heat exchanger technology, chemical processes, and materials. Much of this work has been cooperative with the using industries and appears to be bearing fruit.

ECUT management itself, working with a group of outside reviewers drawn from industry and elsewhere, has recommended that its research be principally directed toward work on chemical and physical processes that have generic applications in improving efficiency. ERAB concurs with augmenting ECUT's activities along these lines, using funds drawn from savings realized from the phasing out of the inventions and the appropriate technology program.

---

*See dissenting opinion in Appendix D.

Overall, ERAB recommends that the funding level remain the same, but that virtually all the R&D money be used in a redirected ECUT program.

Industrial Conservation ($67.3/$0.0) Industrial Conservation ranked in the high category when compared with all other DOE R&D programs. ERAB recommends that this program be restored close to FY81 funding levels. Thus, ERAB recommends an increase in the proposed budget.

ERAB expressed concern that, although all industries have incentives to conserve energy, many of them lack the ability to conduct R&D either because of their fragmented industrial structure or because of historic failure to support research. This appears to be true of many small and medium sized businesses that, in the aggregate, consume large amounts of energy. Short-term, high-payoff R&D will not be conducted unless Federal leadership is given.

ERAB noted that many of the industrial conservation projects previously undertaken by DOE have been highly effective and have included cost recovery features for the Government. Continuity and continued skilled management are important features in the prior (and future) success of this R&D component.

C. Solar Programs

Solar Applications for Buildings ($224.9/$84.7) The Solar Applications for Buildings program was given a high priority within the medium range. ERAB believes the funding should remain the same, recognizing that the lower funding levels will stretch out the time frame for achieving lower cost photovoltaic electricity.

Photovoltaic (PV) R&D has approximately 75% of the budget in this program. PV and fusion are the major renewable options available for electricity generation if the CO_2 problem is found to be significant. Major cost reductions in PV have been achieved, and further reductions leading to an attractive economic potential appear highly likely if Federal funding is maintained. A separate report recently submitted to ERAB by the Solar Photovoltaic Advisory Committee of the Board provides detailed recommendations in this area. A halving of the budget for PV (as the President has recommended) will mean that development of low-cost PV will slow down, increasing the opportunities for foreign manufacturers to dominate the technology. Therefore, continued support of PV is important to maintain the momentum developed by this program. Emphasis should be placed on advancing those photovoltaic technologies required to achieve cost reductions in both module and cell areas as well as balance of system areas. Premature demonstration activities should be curtailed.

Continued Federal support for basic and applied research in passive solar technology will pay high dividends. The building industry is fragmented and has no institutions capable of supporting this R&D activity. R&D activity on active, building-by-building solar heating should be relinquished to private industry. Research on passive solar cooling deserves support, particularly cooling systems that are effective in humid sections of the country. Similarly, solar pond technology should be continued since it is highly promising.

Solar Thermal Applications for Industry ($138.3/$44.0) ERAB recommends reduced overall funding with increased emphasis on selected elements within this medium priority program. High temperature collectors (concentrators and receivers) deserve increased support because of their great versatility in application and the lack of industrial R&D. Dish technology development should remain at the module level until technical and economic feasibility has been attained with several different modules.

Areas to be considered for reduced Federal support include those technologies where significant industrial interest is expressed already, specifically development in heliostat and external steam receivers, operation of Solar One and Shenandoah, and technology for process heat applications.

D. Other End-Use Technologies

Direct Coal Combustion Systems ($37.4/$38.8) No other direct combustion alternative exists that eliminates the need for scrubbers and is close to commercialization. Hence, ERAB recommends that the direct coal combustion systems program be continued with the same level of funding, although some redirection of emphasis is appropriate.

Atmospheric fluidized bed combusters for industrial applications are ready to move into the commercial market in configurations supported by the Federal Government in the past; further funding is no longer needed and should support instead advanced combustors that appear capable of burning with lower SO_x and NO_x emissions.

Research on pressurized fluidized bed combustors for utility and industrial applications is longer term with a promise of providing multifuel capabilities in, for example, cogeneration applications. In addition, advanced combustion concepts and alternative fuel utilization research may provide environmental or fuel substitution advantages.

Fuel Cells ($32.0/$28.6) Fuel cells represent an undeveloped technology with important environmental advantages. Although both the electric and gas industries are supporting research, some Federal support is essential for its continuation. ERAB recommends no change in the level of funding.

During FY 82, the phosphoric acid fuel cell technology will be tested in a 4.8 MW plant under construction in New York City; extension of the program should be assured to include testing of coal-derived fuel (methanol) and possibly shale liquids. The solid oxide fuel cell, while beyond the proof-of-principle stage, still requires subsystem development. In addition, the molten carbonate fuel cell with its high susceptibility to sulphur catalyst contamination and other high risk advanced technologies deserve continued support.

Heat Engines and Heat Recovery ($31.5/$15.6) ERAB recommends no change in funding for the heat engine program, but some redirection of effort is needed. The coal fueled diesel engine has little chance of economic success; its funding should be shifted to development of high temperature gas turbines. Since high risk technology for high efficiency central and dispersed power systems is the goal of this program, a major effort directed at higher efficiency/higher temperature gas turbines, the sine qua non for an efficient combined cycle, coal-fired power system, is more appropriate.

The heat recovery program supported with carry-over funds from FY 81 should be continued with additional funding requested for continuation of uranium enrichment plant heat recovery projects in FY 83.

VII. SCIENCE AND TECHNOLOGY BASE

A. Introduction

It has long been agreed that the Federal Government must play a primary role in the maintenance of research programs that contribute to new understanding and to expansion of the U.S. technology base. Generally, the activities sponsored by the DOE for this purpose represent an appropriate set of programs for maintaining and expanding the energy technology base, the body of knowledge and know-how upon which the nation must rely for implementation of our overall objectives in the energy field.

The program elements in DOE that constitute the science and technology base fall largely into two categories: general science and energy supporting research. It is the assessment of the Energy Research Advisory Board that both components are appropriate, represent research of high quality and scientific potential and, with minor exceptions, especially in basic and biological energy sciences, that the President's proposed budget for FY 82 calls for an adequate allocation of funds for these programs or allows for adjustments and reallocations that can assure continued progress towards the Nation's goals under the overall constrained budgetary circumstances.

Table VII-A summarizes the relative priorities and funding recommendations. It should again be noted that a separate set of criteria were used to evaluate these programs; thus, the rankings are not directly comparable with the R&D programs discussed in prior sections of this report.

B. General Science

These programs in General Science support the Nation's effort in high energy physics, nuclear physics, general life sciences, nuclear medicine, and the preparation of certain radioactive and heavy isotopes for scientific and commercial uses in a myriad of endeavors. Historically and by interagency agreement, DOE is the lead agency for these national programs that are of long-range importance in the energy effort but, in addition, have broader significance for continued progress in many commercial developments, in space, in defense, and in health-related fields. These basic research programs are sometimes characterized as a "national trust." ERAB proposes no change in these missions and no modification in present budgetary projections for them.

TABLE VII-A

SUMMARY
R&D PRIORITIES
SCIENCE AND TECHNOLOGY BASE

RANK[1]	PROGRAM	PRIORITY[2]	President's FY82 Budget	ERAB Funding[2] Recommendations
1	Materials Sciences	HIGHER	112.1	More
2	Climate and CO_2 Research		16.7[3]	More
3	Chemical Sciences		73.9	More
4	Biological & Environmental Research		153.8[3]	More
5	Biological Energy Sciences		9.4	More
6	Nuclear Medicine		50.5	Same
7	High Energy Physics		392.7	Same
8	University Research		10.6	More
9	Environment and Safety		49.6	Same
10	Engineering, Math & Geosciences		32.3	Same
11	Nuclear Physics		122.9	Same
12	Nuclear Sciences	MEDIUM	37.7	Same
13	Advanced Energy Projects		8.2	Same
14	Technology Assessments	LOWER	3.0	Same

---

[1] Rankings represent consensus view of ERAB and should be interpreted with caution; the differentiation between any two consecutive programs is not necessarily significant.

[2] Priority reflects ERAB view of overall merit of program; funding recommendations relative to the President's budget request for FY82 reflect on Federa role.

[3] The Biological and Environmental Research Program includes Climate and CO_2 Research with a total budget of $170.5 M.

High Energy Physics ($348.2/$392.7)* This program is the Nation's principal effort to explore the fundamental components and interactions of matter. It depends upon unique, large scale, high cost experimental facilities that are used by laboratory and university scientists to probe ever deeper into the structure of matter and the universe. Support of such research is a Federal responsibility since it is not expected to have commercial significance, although many commercial applications have arisen from technology developed through this program. Some university scientists who work at DOE facilities are supported by NSF; a joint planning process is used to ensure coordination. Support at about the present level will continue a longstanding U.S. commitment toward excellence in this field of science.

Nuclear Physics ($109.2/$122.9) The Nuclear Physics Program addresses the fundamental interactions and structure of the atomic nucleus. It develops and uses unique large-scale facilities at national laboratories and universities with a particular emphasis on heavy ion research and meson interactions with matter. Such research is long-range and would not be carried out without Federal support. Joint planning with NSF, the only other sponsor in this field, is intended to provide a balanced national effort. Support should be continued at about the same level-of-effort.

General Life Sciences and Nuclear Medicine ($45.9/$50.5) This combination of long-term biological research and unique medical application of nuclear techniques is clearly of value to the public and is unlikely to be undertaken by private industry. The genetic and cellular research provides a fundamental scientific underpinning for the more applied Biological and Environmental Research program while the nuclear medicine component exploits unique DOE facilities for the production, testing and application of radioisotopes. The current level-of-effort seems appropriate.

C. Energy Supporting Research

The Energy Supporting Research Programs of DOE are intended to expand the nation's technological alternatives by explorations in chemistry, materials science, biology, engineering and mathematics, geosciences and environmentally-related fields of health. Particularly important is the Climate and CO_2 research program since CO_2 accumulation may prove to be a "show-stopper" in terms of expanded fossil (but not biomass) energy alternatives. Additionally, the problem of acid rain is suggested as an important new area for emphasis by DOE.

---

*FY81 funding/FY82 President's request in million $ are shown in parenthesis.

Materials Sciences ($95.2/$112.1) This program includes long-range research in solid state physics, materials chemistry, metallurgy and ceramics that is intended to provide a knowledge base that will lead to improved economics and performance of energy systems. Materials problems plague many energy production and conversion systems; a strengthening of this program would be a sound long-term investment since it addresses such important generic areas as high temperature alloys, corrosion, radiation damage and the physics and chemistry of surfaces. Increased operating costs of major facilities (such as neutron sources) has squeezed this program in recent years. Increased funding is recommended.

Climate and CO_2 Research ($12.9/$16.7*) ERAB members are in strong agreement on the importance of this program due to its long-term significance for public policy toward the use of fossil fuels. Although the predicted effects of increased CO_2 in the atmosphere occur well in the future, an intensified research effort is needed now in order to ensure that better information will be available for future decision making. The Federal Government clearly has the principal responsibility for research in this area; an increased effort is recommended.

Chemical Sciences ($69.0/$73.9) ERAB members are in general agreement that this program should be increased. The research supported is long-range and fundamental and addresses processes, interactions, and chemical transformations in liquids, gases and plasmas. Potential applications include developments ranging from new chemical catalysts for coal liquefaction to improved knowledge of combustion in automotive engines. Increased support in this area has recently been recommended by a detailed study of the Committee on Chemical Sciences of the National Research Council; ERAB concurs with that view.

Biological Energy Research ($7.7/$9.4) This program is designed to investigate the fundamental processes underlying plant biomass productivity and conversion of biomass to other materials for use as fuels or chemicals. ERAB members were generally in agreement that this program should be increased due to the long-term potential contribution from biomass and the small size of the present effort.

University Research ($11.8/$10.6) This program is primarily oriented toward improving the quality and quantity of scientific personnel in energy-related areas. This is clearly an area appropriate for Federal concern; an expanded program is recommended due to the modest level of the present effort.

---

*Funded under Biological and Environmental Research. Excluded from Basic Energy Sciences budget.

Engineering, Math and Geosciences ($25.9/$32.3) Each of these areas of science, engineering, and mathematics is pertinent to energy and should be addressed by DOE programs. For example, the programs of the Atomic Energy Commission (AEC) were the first of the high technologies to rely effectively on computer modeling. For this reason, the AEC and its successor agencies, including DOE, have been the leading government agencies in supporting R&D in these areas. The DOE support should be targeted carefully toward those topics that are most obviously relevant to energy and correspond to scientific information needed by other DOE programs. In view of the importance of this effort, the present overall program is minimal.

Nuclear Sciences ($33.7/$37.9) This program includes research in low energy nuclear physics, actinide element chemistry and compilation of nuclear data relevant to the needs of the fission and fusion programs. It also supports the production, using unique federally funded facilities, and distribution of isotopes for medical and industrial use. The present funding level should suffice.

Advanced Energy Projects ($6.7/$8.2) This program identifies and tests the scientific feasibility of novel energy concepts. Particular attention is paid to proposed approaches that do not fit neatly in the scope of other DOE programs with the expectation that concepts that prove scientifically feasible and appear economically promising will be subsequently developed by other DOE programs or by private industry. In the view of ERAB, this program provides a worthwhile safety valve to ensure that promising ideas will not be ignored. The program should not be allowed to grow unduly at the expense of the higher priorities that have been identified, but should remain at about present funding levels.

Technical Assessment Projects ($9.5/$3.0) This program provides support for independent, objective analyses of R&D programs and needs and contributes to the overall planning effort of the Department. Present funding levels seem sufficient; expansion in this area is not needed.

D. Environmental Research

Biological and Environmental Research ($168.4/$170.5) This program investigates the potential human health and environmental impacts of new energy technology. It involves identifying the substances produced by energy systems, including such phenomena as acid rain; tracing their movement through air, water and land; and assessing their effects on humans and other living systems. Such research is clearly a Federal responsibility. It could not and should not be entrusted to private industry due not only to the long-term generic character of the work but also to the need for credibility and comprehensiveness. Certain unique long-baseline programs in ecology and radiation effects can only be carried out under Federal auspicies. This program has been about level or reduced in recent years; an increase in funding is warranted.

ERAB recommends a change in program emphasis with a major, urgent concentration of effort to resolve the acid rain problem. The ability to increase the use of coal, particularly the high sulfur coals in the Eastern U.S., depends on a far better understanding of the causes as well as the impacts of acid rain. The information currently available raises as many questions as it seems to answer regarding the relation of coal-based emissions to the occurrence of acid rain. Thus, a major effort by DOE is in order to assure that future increased use of coal remains an acceptable option.

Environment and Safety ($48.5/$49.6) This program is designed to assess information concerning the environmental impacts of energy development, the safety impacts of various technologies, and the health and safety aspects of DOE and contractor facilities. Clearly, DOE must be concerned with the safety both of energy systems and of the facilities for which it is responsible.

E. Federal Role and the Energy Technology Base

The distribution of performer efforts for the DOE technology base program (government laboratories, universities, or industry) deserves reexamination and both ERAB and DOE have embarked upon studies that will culminate in recommendations on this score within a few months.

The high Federal role in these efforts is worthy of emphasis if the Nation's long-run energy needs are to be met. Industry conducts and will continue to conduct basic and applied research to serve its short-term economic needs, but interim economic incentives will always result in disjointed efforts from the national perspective. Only the Federal Government can assure a balanced approach for the longer run. The DOE research program also contributes to the technology base relevant to other national missions since advances in underlying knowledge can be widely applicable.

Finally, the reluctance of Congress, until now, to appropriate funds for the support of economic and social science studies relevant to energy demand usage and conservation has resulted in an incomplete DOE program for its technology base. ERAB again endorses the authorization and implementation of such programs in DOE.

VIII. CONCLUSIONS AND RECOMMENDATIONS CONCERNING ENERGY R & D PRIORITIES

A. Overall R & D Program Priorities

Table VIII-A summarizes the results of the Board's evaluations of the four major energy R&D sectors: Electric supply, liquid and gas supply, conservation and utilization, and technology base. There are a number of electric-supply-related R&D programs that, for a variety of reasons, are of low priority and whose funding should either be substantially reduced or terminated. This reflects, in part, the Board's view that although no "correct balance among energy forms and resources can be defined a priori," R&D for electric supply technology is receiving a larger proportion of funding than the present and projected share of electricity in our national energy supplies.

The Board concluded that the overall Federal funding level in the liquid and gas R&D supply was higher than needed. This view results from the belief that the oil and gas industries are in a good position to take advantage of energy R&D opportunities and that the Federal Government role should be primarily focused on longer-term, higher-risk, applied research and development. It should not directly support costly demonstrations or large pilot plant projects (except as funded by loan or price guarantees through DOE and later under the Synthetic Fuels Corporation). However, great care should be taken in phasing out existing Federal R&D programs to insure technology transfer to the private sector.

In the conservation and end-use utilization area, the Board concluded that funding should be increased. The Board recognizes that higher energy prices have resulted in substantial reductions in energy demand and that this process is likely to continue. However, private enterprise in the buildings sector and, to a large degree, in the industrial sector is unlikely to do all the R&D needed. The Board believes that funds allocated to R&D in these two sectors should be increased. Such increases, combined with other ERAB recommendations, would increase the total allocation to the utilization and conservation technologies.

With regard to technology base programs, it was the Board's view that the funding for such programs should not be decreased and in certain areas should be increased. This stems from the Board's belief that, of all the sectors for energy R&D funding, the technology base programs are less likely to attract industry support; therefore, the Federal Government's role is greatest. Continued and increased support in the technology base programs offers the best chance for substantial technological break-throughs and improvements.

TABLE VIII-A

RELATIVE PROGRAM RANKING

	Electric Supply		Fuel Supply		Conservation & Utilization		Science and Technology Base[a]	
Priority	Program	Funding	Program	Funding	Programs	Funding	Programs	Funding
HIGHER							Materials Sciences	More
							Climate & CO_2 Research	More
							Chemical Sciences	More
	Commercial Nuclear Waste	Same					Biol/Environmental Research	More
							Biological Energy Sciences	More
					Coal Combustion	Same	Nuclear Medicine	Same
	Defense Nuclear Waste	Same			Buildings/Community Systems	More	High Energy Physics	Same
					Industrial Conservation	More	University Research	More
			Enhanced Oil Recovery	Less				
							Environment & Safety	Same
							Engineering/Math/Geosciences	Same
							Nuclear Physics	Same
MEDIUM	Conventional Reactors	More	Advanced Technology	Same	Transportation Conservation	Same		
			Enhanced Gas Recovery	Less	Solar Applications/Bldgs	Same		
	Breeder Fuel Cycle R&D	Little Less					Nuclear Sciences	Same
	Centrifuge	Same						
	LMFBR	Same			Heat Engines/Heat Recovery	Same		
			Coal Liquefaction	Less			Advanced Energy Projects	Same
	Solar Power Technology	Less			Multi-Sectors Conservation	Same		
	Advanced Isotope Separation	Same			Fuel Cells	Same		
			Biomass Energy	Same				
			Surface Coal Gasification	Less				
LOWER			Mining R&D	Less	Solar Applications/Industry	Less		
	Magnetic Fusion	Little Less	In-Situ Oil Shale	Less			Technology Assessments	Same
	Light Water Breeder	Less						
	Uranium Resource	Same						
	Electric Energy/Storage	Less						
	Hydropower	Zero						
	Clinch River Breeder	Less						
	Geothermal	Less						
			Alcohol Fuels	Same				
			In-Situ Coal Gasification	Less				
	Magnetohydrodynamics	Zero						

[a] [illegible] programs were evaluated by a different set of criteria from the R&D programs and are not directly comparable to them.

The remainder of this Chapter summarizes the conclusions and recommendations* of the Board in each of the Energy R&D program areas.

B. Electric Supply R&D Programs

With regard to Electric Supply R&D Programs, the major conclusions of the Board are as follows:

1. Continued emphasis is needed to complete the development and commercialization of light water nuclear power reactors in the U.S. A commitment has been made by this Administration to nuclear power. It has a significant role in the nation's energy mix; continued Federal support at this time is necessary. Hence, the Board recommends that continued funding be given to conventional reactor systems and safety, waste disposal programs (particularly accelerated demonstration), and uranium enrichment.

2. With respect to the liquid metal breeder reactor, research and development should be continued in order to maintain the capability for demonstrating breeder technology in the future. However, construction of a demonstration plant in the early 1980s is not an urgent national priority. Sufficient coal and uranium supplies exist to satisfy projected levels of electrical demand for at least 40 years and possibly well beyond. For these reasons, the panel recommends continued research and development on the liquid metal breeder reactor, as well as other breeder concepts, but that demonstration of breeder technology be delayed until a future time.**

3. With respect to fusion, ERAB members agree on the long-term importance of this program and that the primary Federal role should be to continue to sponsor a joint program of the federal laboratories, industry and university scientific communities to determine if fusion can be practical. The potential payoff is very large, but is much too far in the future for significant private sector support. There was agreement that a stretch-out of the program is possible if budgetary pressures demanded it, but maintenance of a substantial level of Federal R&D funding is judged to be essential. It is also recommended that an enhanced effort to examine the use of fusion for the breeding of nuclear fuels deserves consideration.

---

*All funding recommendations are relative to the President's FY82 budget request.

**See dissenting opinion and additional remarks in Appendix D.

4. Finally, there are several electric programs for which funding should be reduced or eliminated (such as solar power technology, light water breeder reactors, electric transmission systems, geothermal, magnetohydrodynamics, and hydropower) due to their relatively small contribution to electric supplies in comparison with other programs.

C. Liquid and Gas Supply R&D Programs

With regard to Liquid and Gas Supply R&D Programs, the major conclusions of the Board are as follows:

1. With respect to enhanced oil and gas R&D recovery programs, the ERAB concluded that the U.S. oil and gas industry has sufficient resources and financial incentives to develop these technologies without substantial government assistance. The Board concluded that, even though these programs are important from the standpoint of urgency and energy security, the Federal R&D role should be minimal with less Federal funding needed.

2. With regard to coal liquefaction and coal gasification, it was concluded that large-scale demonstration projects involving substantial cost-shared Federal outlays are not necessary or appropriate considering the financial guarantees (e.g., loan guarantees, price guarantees) that are available from DOE and the Synthetic Fuels Corporation. The major Federal effort in synthetic fuels research and development should be directed at innovative concepts at the laboratory and small pilot-plant scale with particular emphasis toward exploring a wider range of technological options with potential for significant efficiency and cost improvements. The Board recommends a reduced budget for DOE's cost-shared projects at the large pilot plant and demonstration-plant scale.

3. With respect to in-situ oil shale recovery, the Board recommends a decrease in funding based on the fact that several major oil companies have in-situ shale projects that do not involve Federal assistance.

4. The funding level for R&D directed at producing liquids and gases from biomass and the production of alcohol is at an appropriate level.*

5. Continuing increases in the price of conventional oil and gas suggest that the time when coal and oil shale will be economic sources of oil may be near at hand. This situation is stimulating the private sector to consider some commercial operations by 1990. ERAB concludes that

---

*See ERAB reports on Biomass and Alcohol Fuels.

the private sector can be expected to carry out important actions that justify a lessening of DOE research in these technologies. However, it is recommended that DOE accelerate its research in environmental problems and infrastructure problems associated with the commercialization of these technologies.

6. The bulk of the coal produced for the next several decades will be used directly as boiler fuel, both in existing and new units, reducing dependence on oil and gas for this purpose. But improved emission control technologies to reduce SO_x, NO_x and particulate emission in flue gases will be essential to the success of this effort. ERAB therefore urges that this part of the Advanced Research and Environmental Control Technology (FE) programs be increased and given higher priority at the expense of the other activities in this program.

D. Conservation and Utilization R&D Programs

With regard to Conservation and Utilization R&D Programs, the major conclusions of the Board are as follows:

1. The overall level of Federal R&D funding for conservation and improved utilization programs is too low in view of their potential for energy improvements and the inability of many important energy-consuming sectors to conduct R&D. Moreover, Department-wide, the balance between supply oriented R&D and conservation R&D is too heavily weighted toward the supply side.

2. The Board concluded that R&D in Buildings and Community Systems needs increased funding in view of the large amount of energy consumed in this sector and the lack of private sector institutions able to undertake building systems R&D. This is particularly true in the case of the important retrofit technologies.

3. R&D in the transportation sector should be redirected away from its present heavy emphasis on automobile engines and toward the heavy freight truck sector. The phase out should include a sharp reduction in work on the electric and hybrid vehicle.* Transportation systems utilization activities deserve support. Overall, funding levels in this area should remain the same.

4. Funding for the Multi-Sector Conservation program should remain the same and should be concentrated on work in the Energy Conversion and Utilization Technology program (ECUT).

---

*See dissenting opinion in Appendix D.

5. Funding for the Industrial Conservation programs should be restored to approximately the level in FY81. Many industries have no capacity for private sector R&D and that the close cooperation with users that characterized this program deserves continuation.

6. Solar Applications for Buildings should be redirected slightly to emphasize passive heating and cooling. Solar pond and ice cooling technology should be continued since it is highly promising.

7. Funding for Solar Thermal Applications for Industry deserves slightly lower levels of support with redirection toward high temperature collector and dish technology development.

8. Funding for direct coal combustion systems (a high priority program), fuel cells, and heat engines and heat recovery should remain at the same levels.

E. Science and Technology Base Programs

The Board recommends increased Federal funding in a number of program areas. The Board would give particular emphasis to environmental and health-related research, clearly important from the standpoint of understanding and evaluating the long-term impact of the introduction of new energy technologies. Of particular importance are the CO_2 and acid rain issues. As previously indicated, the panel believes that the science and technology base programs should have a relatively higher Federal priority because of the lower likelihood that industry would provide adequate funds for such basic and applied research.

F. General Conclusions and Recommendations

1. Serious attention must be paid to several related environmental issues. First, development of nuclear waste disposal technologies and control technologies in the Advanced Research and Environmental Control Technology Program are necessary for environmentally sound implementation of present and future technologies. Second, several of the programs in the science and technology base are essential if a proper energy mix is to be employed. These include the acid rain program, the climate CO_2 program, and Health and Environmental Research.

2. Our energy system is a web of machines and people; the current budget is focused on machines. Consideration should be given to research in social areas, to prepare for rapid energy development in certain portions of the country and to help transfer conservation technologies for the industrial and residential sectors.

APPENDIX A

Department of Energy
Washington, D.C. 20585

AUG 13 1981

Mr. Louis H. Roddis, Chairman
Energy Research Advisory Board
110 Broad Street
Charleston, S. C. 29401

Dear Lou:

The Department of Energy has invested heavily over the past several years in research and development on a wide range of energy alternatives. DOE now plans to increase emphasis on long-term, high-risk, and potentially high-payoff R&D programs. As such, it is timely to review our R&D priorities and to make some hard choices on which programs to pursue vigorously and which to deemphasize based on a realistic appraisal of both our energy options and energy needs for the foreseeable future. I would appreciate the advice of the Energy Research Advisory Board on these matters and particularly the Board's recommendations on overall Federal energy R&D priorities.

This effort can be based on the Board's broad knowledge of DOE programs and especially on the recent R&D panel activities to review the energy technology base and to develop criteria and methods for assessing priorities. Your terms-of-reference should include review and recommendations on the following concerns:

- The relative merits of each major R&D program with respect to such criteria as the technical and economic potential, urgency and lead time required, benefits and costs of Federal funding, contribution to energy security, health and environmental risks, and the appropriate Federal role;
- The appropriate R&D funding balance between electric power supply, fuels supply, conservation, and technology base program areas;
- The appropriate program orientation and balance between research, development, and demonstration activities;
- The strategic R&D objectives for the near-, mid-, and long-term.

Your thoughts on these matters would be particularly useful by November 16, 1981, to assist the Secretary and myself with our reviews of the DOE Sunset Report and the FY83 budget. However, I regard this as a continuing and important assignment for the Board and would also appreciate your recommendation on the next steps. Specifically, you should consider what efforts both ERAB and the Department should undertake toward improving our overall R&D planning, management, and evaluation processes and decisions. I will personally look forward to your report and hope to meet frequently with you and the Board as the study progresses.

Sincerely,

W. Kenneth Davis
Deputy Secretary

APPENDIX A

THE SECRETARY OF ENERGY
WASHINGTON, D.C. 20585

April 30, 1980

Dr. Solomon J. Buchsbaum
Executive Vice President
Customer Systems
Bell Laboratories
Crawford Corner Road
Holmdel, New Jersey 07733

Dear Dr. Buchsbaum:

Research and development to increase the supply, conversion efficiency and conservation of energy is vital to our national interest. I am particularly concerned about the adequacy of the Department's efforts in this area. The Department is presently undertaking a review of the technology base component of our R&D programs under the leadership of the Director of Energy Research with a view toward improving their effectiveness. I would appreciate the participation of ERAB in this process in order to give us the benefit of external views on the adequacy of these programs.

There are some broad concerns that need to be addressed:

- The adequacy of the research underpinning for technology development programs.
- Possible gaps or duplications of effort.
- The balance among research performers (universities, laboratories, industry).
- Significant R&D opportunities that our programs may be missing.

Obviously, a complete review of this whole area would be a lengthy and complex task and I view this as a continuing effort through which ERAB might help the Department. In the shorter term, an initial review of the technology base in conjunction with the work Ed Frieman already has underway could be helpful in contributing to our final decisions on the FY 1982 budget if it could be completed by the end of the summer. I hope that ERAB can devote a portion of its summer study to this task.

Sincerely,

John C. Sawhill
Deputy Secretary

APPENDIX B: BACKGROUND INFORMATION

CHRONOLOGY OF R&D PANEL MEETINGS[1] APRIL 30, 1980 TO NOVEMBER 5, 1981

1. Planning and Implementation

On April 30, 1980, Deputy Secretary John C. Sawhill requested ERAB to review the R&D programs in the Department. An initial review of the technology base in conjunction with the work the ER Director had underway would be helpful in contributing to the final decision on the FY 82 budget. ERAB approved the terms of reference and established a panel.

On June 7, 1980, the R&D Panel met to formulate questions and issues for Panel consideration, to develop outlines for Panel and Subpanel reports, and to discuss organizational matters. The Panel also approved an agenda for the first full-scale Panel and Subpanel organizational meetings to be held.

2. Technology Base Assessment and Detailed Program Reviews

On July 10, 1980, the Fossil R&D Subpanel met in Washington to receive briefings on fossil energy technology and R&D programs, review DOE's documents on technology base assessment, and discuss preparation of the initial draft input to final R&D Panel report.

On July 10th and 11th, 1980, the Conservation R&D Subpanel met in Washington, was briefed on conservation technology and R&D programs, and held initial discussions on Conservation Subpanel input into ERAB Technology Base Report.

On July 22, 1980, the Nuclear R&D Subpanel met in Washington for a summary of fact-finding briefings on nuclear technology and R&D programs. They discussed eight items pertaining to the technology base assessment of DOE's Nuclear R&D programs.

- Converter Reactor Systems
- Commercial Nuclear Systems
- Advanced Nuclear Systems
- Spent Nuclear Fuel
- Breeder Reactor Systems
- Advanced Isotope Separation Systems
- Nuclear Uranium Assessment
- Gas Centrifuge

---

[1] All meetings were open to the public with notice in Federal Register.

On July 23, 1980, the Solar R&D Subpanel met in Washington for briefings on solar technology and R&D programs to review DOE documents on the technology base component of DOE's Solar Energy R&D program and to hold initial discussions on Solar Energy R&D Subpanel input into the ERAB Report.

On July 23, 1980, the Energy Research R&D Subpanel met in Washington for briefings on Basic Energy Sciences and other energy research programs and to review the technology base research support by the Office of Energy Research.

On July 29, 1980, the Environment R&D Subpanel met in Washington for discussions on the status of technology base assessment. Representatives from the research offices within DOE Office of Environment discussed highlights of their programs. Office of Technology Impacts discussed the complexity of doing good assessments stressing the problems of the data collection and management.

On July 29, 1980, the Resource Applications R&D Subpanel met in Washington for briefings on resource application programs to review DOE documents on the technology base component of DOE's Resource Applications R&D Program, and to hold initial discussions on Resource Applications R&D Subpanel's input into ERAB Technology Base Report.

On July 30th and 31st, 1980, the R&D Panel met in Washington for discussions on crosscutting issues and integration problems. Subpanel members discussed status of membership, information needs, plans to complete reports and planned for activities at La Jolla.

3. Interim Report on DOE Technology Base "R&D Needs in DOE"

On August 18th, 1980, the Board met as a whole, then divided into their individual subpanels to complete the initial phase of the study and report to the full ERAB during the course of the meeting.

On August 18th - August 22nd, 1980, the ERAB Summer Study meetings were held to develop an interim report, findings, conclusions and recommendations on the technology base assessment (TBA) study. The following seven (7) subpanels were involved

8/19/80 - R&D Integration Panel - La Jolla
8/19-21/80 - Energy Research R&D Subpanel - La Jolla
8/21/80 - Resource Applications R&D Subpanel - La Jolla
8/19/80 - Solar R&D Subpanel - La Jolla
8/18-20/80 - Environment R&D Subpanel - La Jolla
8/18-20/80 - Nuclear R&D Subpanel - La Jolla
8/19-21/80 - Fossil R&D Subpanel - La Jolla

In addition, ERAB conducted several in-depth technical reviews which were also used as a basis for the R&D priorities study. Specifically, ERAB conducted studies on: (1) Efficient Use of Energy (Conservation); (2) Fossil Energy; (3) Nuclear Energy; (4) Solar Energy; (5) Resource Applications; (6) Environment; and (7) Energy Research.

On August 22, 1980, the ERAB Board in La Jolla received the draft TBA report and approved it subject to incorporation of the members' revisions. The report was subsequently transmitted to the Secretary of Energy as an interim report on 9/5/80 (Research and Development Needs in the Department of Energy).

4. Methodology for Setting R&D Priorities

On December 19, 1980, the R&D Panel met in Washington to discuss a methodology for evaluating energy R&D priorities. Discussions were held on alternative approaches to implementing R&D Priorities Study proposed in Bill McCormick's "White Paper," suggesting the R&D needs exercise should be expanded to set overall priorities and trade-offs between R&D program areas based on consistent criteria.

On January 26, 1981, the R&D Panel met in Cleveland to dicuss the methodology for evaluating energy R&D priorities. Discussions were held to reveiw methodology for ranking priorities and structure of Panel/Subpanels. Other topics discussed were:

Membership, Technical Support Group
Definition of Criteria
Weight/Value Functions
Input, Value Judgments, and Outputs (by Subpanel)
Technology Lists
Schedule
Report Outlines

5. R&D Priorities and Study Report

At the February 5-6, 1981 ERAB meeting, discussions were held on the recent activities of the R&D Panel and alternate approaches. It was proposed that a number of subpanels could be formed to provide input on energy technologies and one which is to cover technology base and environmental considerations. Several energy product subpanels would then utilize input from the foregoing subpanels. The plan also included possible utilization of the MARKAL computer model developed by BNL.

At the July 9-10, 1981 ERAB meeting, John Foster, Chairman of the Panel, reviewed their past efforts beginning with the Interim Report transmitted to the Department last September, following an extensive effort culminating in the Summer Study meeting in August 1980.

On August 13, 1981, Deputy Secretary Kenneth Davis requested advice of the Energy Research Advisory Board on the R&D priorities and the Board's recommendations on the overall Federal energy R&D priorities.

The Panel was in the process of developing a methodology which would assist in assigning priorities to the nation's energy R&D programs, and would also help to illuminate the appropriate role of the Federal Government in these programs. For the purposes of the R&D priorities study, the R&D Panel would consist of all the members of ERAB with an Executive Committee appointed by the Chairman to include John Foster (Chairman, R&D Panel), William McCormick (Vice Chairman, R&D Panel), Lou Roddis (Chairman of ERAB), and Ivan Bennett (Vice Chairman of ERAB). Whether additional Panel members would be appointed would be decided at a later date; previous subpanels to the R&D Panel were dissolved.

At the September 2-3, 1981 ERAB meeting, the Chairman reported on the progress and current status of the R&D study and noted the August 13 letter request from the Deputy Secretary which sets the framework for it. The Deputy had asked that the report be completed by mid-November. John Foster, R&D Panel Chairman, described in detail the activities of the Panel, the methodology they were applying, and the evaluation forms each member will be asked to complete and return for collation. He urged each member to include any narrative comments along with their program evaluations which would serve to explain any particular rating made by a member and serve as a basis for drafting the report.

A detailed discussion then followed among all ERAB members in an attempt to establish a uniform basis among them all for their responses. These responses were discussed at a special meeting of the Panel on September 24. Preliminary results were sent to members on October 1. ERAB members submitted respective subsection drafts October 15, and a draft of the report was sent to ERAB members by October 30. The final review took place at the ERAB meeting on November 4-5.

On September 24, 1981, the R&D Panel met in Washington to discuss a number of cases in which overall programs were not highly rated, but individual aspects of subprograms of the major program were essential. The Panel concluded that considerations for subprograms of the major programs, particularly those involving subprogram funding recommendations, should be highlighted by discussion in the narrative portion of its report.

The initial results of the prioritization study were discussed at the Energy R&D Panel Meeting held September 24, 1981, in Washington, DC. At that meeting consensus recommendations were reached concerning funding where no consensus had resulted from the raw data evaluation. It was recognized that the final priority ratings would be the result of an evaluating process.

TABLE B-1

ENERGY R,D&D PROGRAM BUDGET SUMMARY

		Congress. Budget Authority	Pres. Request	Congress. Budget Authority
		FY1981	FY1982	FY1982
			(in $thousands)*	
A.	Electric-Related Supply			
1.	Magnetohydrodynamics (FE)	66,533	0	29,000
2.	Geothermal (CE)	153,645	46,775	57,775
3.	Hydropower (CE)	2,409	0	2,750
4.	Electrical Energy Systems and Energy Storage Systems	109,800	47,525	65,625
5.	Solar Power Technology (CE)	112,100	19,400	73,800
6.	Magnetic Fusion (ER)	391,000	456,100	484,600
7.	Uranium Resource Assessment (NE)	25,925	5,800	5,800
8.	Uranium Enrichment (NE)			
	a-Centrifuges (NE)**	356,315	760,300	691,800
	b-Advanced Isotope Separation (NE)	79,300	85,237	85,237
9.	Conventional Reactor Systems (NE)	81,500	68,000	101,750
10.	Breeder Reactors (NE)			
	a-Liquid Metal Fast Breeder Reactor	371,919	387,842	405,628
	b-Clinch River Breeder Reactor	172,000	254,000	228,000
	c-Light Water Breeder	60,200	58,000	45,000
	d-Fuel Cycle R&D	47,500	26,100	48,100
11.	Nuclear Waste			
	a-Commercial (BE)	201,415	227,551	208,701
	b-Defense (DP)	298,445	390,000	384,800
12.	Mining R&D (FE)	40,169	21,000	17,000
	Subtotal	2,570,175	2,853,630	2,935,366
B.	Liquids and Gas-Related Supply			
13.	Advanced Technology (FE)	95,761	94,500	84,500
14.	Coal Liquefaction (FE)	276,997	105,200	248,200
15.	Surface Coal Gasification (FE)	69,618	53,440	56,300
16.	In Situ Coal Gasification (FE)	9,960	8,300	8,300
17.	Enhanced Oil Recovery (FE)	16,158	20,100	20,100
18.	Enhanced Gas Recovery (FE)	30,598	10,200	14,200
19.	In Situ Oil Shale (FE)	32,151	16,250	22,350
20.	Biomass Energy (CE)	31,650	20,500	20,500
21.	Alcohol Fuels (CE)	18,000	10,000	10,000
	Subtotal	580,893	338,490	484,450

* Includes deferrals and rescissions, but excludes program direction.

** Includes \$293.3M in FY 81 and \$695.8M in FY 82 for construction of gas centrifuge plant.

TABLE B-1 (continued)

	Congress. Budget Authority FY1981	Pres. Request FY1982	Congress. Budget Authority FY1982
	(in $thousands)*		
C. Conservation & Improved End-Use Utilization			
22. Coal Combustion Systems (FE)	37,368	38,800	42,800
23. Heat Engines & Heat Recovery (FE)	31,468	15,600	15,600
24. Fuels Cells (FE)	32,012	28,600	35,900
25. Buildings & Community Systems (CE)	52,990	28,000	47,400
26. Industrial Conservation (CE)	67,300	0	29,600
27. Transportation Conservation (CE)	102,120	37,000	59,550
28. Multi-Sector Conservation (CE)	25,800	17,500	19,600
29. Solar Applications for Buildings (CE)	224,900	84,700	118,050
30. Solar Applications for Industry (CE)	138,270	44,000	66,050
Subtotal	712,228	294,200	434,550
D. Technology Base			
31. Energy Supporting Research (ER)			
a-Basic Energy Sciences			
aa-Nuclear Sciences	33,700	37,670	37,670
ab-Materials Sciences	95,150	112,060	112,060
ac-Chemical Sciences	69,040	73,940	73,940
ad-Engineering, Math & Geosciences	25,860	32,300	32,300
ae-Advanced Energy Projects	6,650	8,220	8,220
af-Biological Energy Sciences	7,650	9,410	9,410
ag-CO_2 and Climate Research**	12,900	16,700	0
b-Technology Assessments	9,500	3,000	3,000
c-University Research	11,800	10,600	10,600
32. General Science (ER)			
a-High Energy Physics	348,180	392,700	392,700
b-Nuclear Physics	109,200	122,900	122,900
c-Nuclear Medicine	45,900	50,500	50,500
33. Environment & Safety (EP)	48,510	49,600	43,600
34. Biological & Environment Research (ER)**	155,272	153,800	176,500
Subtotal	979,312	1,073,400	1,073,400
TOTAL	4,842,600	4,559,220	4,927,766

*Includes deferrals and rescissions, but excludes program direction.

**The biological and environmental research program includes climate and CO_2 research with a total budget of $168,172 in FY1981 and $170,500 in FY1982.

TABLE B-2

TIME OF EXPECTED IMPACT

PROGRAMS	TIMEFRAME OF IMPACT*		
	Near	Mid	Long
A. Electric-Related Supply			
1. Magnetohydrodynamics (FE)		X	
2. Geothermal (CE)	X		
3. Hydropower (CE)	X		
4. Electrical Energy and Storage Systems (CE)		X	
5. Solar Power Technology (CE)		X	
6. Magnetic Fusion (ER)			X
7. Uranium Resource Assessment (NE)	X		
8. Uranium Enrichment (NE)			
a- Centrifuge (NE)	X		
b- Advanced Isotope Separation (NE)		X	
9. Conventional Reactor Systems (NE)	X		
10. Breeder Reactors (NE)			
a- Liquid Metal Fast Breeder Reactor			X
b- Clinch River Breeder Reactor		X	
c- Light Water Breeder Reactor			X
d- Fuel Cycle (R&D)			X
11. Nuclear Waste			
a- Commercial (NE)	X		
b- Defense (DP)	X		
B. Liquids and Gas-Related Supply			
12. Mining R&D (FE)		X	
13. Advanced Research Tech. Development (FE)		X	
14. Coal Liquefaction (FE)		X	
15. Surface Coal Gasification (FE)		X	
16. In Situ Coal Gasification (FE)			X
17. Enhanced Oil Recovery (FE)	X		
18. Enhanced Gas Recovery (FE)	X		
19. In Situ Oil Shale (FE)			X
20. Biomass Energy (CE)	X		
21. Alcohol Fuels (CE)	X		
C. Conservation & Improved End-Use Utilization			
22. Coal Combustion Systems (FE)		X	
23. Heat Engines & Heat Recovery (FE)		X	
24. Fuels Cells (FE)		X	
25. Buildings & Community Systems (CE)	X		
26. Industrial Conservation (CE)	X		
27. Transportation Conservation (CE)		X	
28. Multi-Sector Conservation (CE)	X		
29. Solar Applications for Buildings (CE)	X		
30. Solar Applications for Industry (CE)	X		
D. Science and Technology Base			X

APPENDIX C: DESCRIPTION OF METHODOLOGY

1. Overview Description of Methodology

The methodology used in this study can be summarized as follows. The list of RD&D programs to be prioritized was agreed upon and then each program was placed into one of four end-use areas: electric-related supply, liquids- and gas-related supply, conservation and utilization, and science and technology base programs (see Table C-1). Criteria to be used in assessing the technology priorities were selected and the definitions for each criterion agreed upon. Two sets of criteria were developed--one set of seven for the R&D programs and one set of five for the Science and Technology Base programs (see Tables C-2 and C-3).

It is important to note that the assessment or evaluation process involving the decision questionnaires which each member was asked to complete were not intended to and would not "fix" the results of the final priority ratings but were designed as an initial point of departure from which final conclusions would ultimately evolve--conclusions which may or may not be consistent with the initial ratings.

Each member of the R&D Panel was asked to make two assessments. The first was used to determine each individual's view concerning the relative importance of criteria for R&D programs and for Science and Technology Base programs. Each criterion was judged "very important" (value of 3), "reasonably important" (value of 2), or "slightly important" (value of 1) relative to Federal energy R&D priorities. A consensus weighting for reach criterion based on the average of all responses was calculated and then normalized to a value of one. The second form was the program evaluation form. For each criterion for each technology the members judged whether that criterion had a high (value of 3), medium (value of 2) or low (value of 1) importance. In addition each member was asked to state a recommended program funding level for each technology, his or her perceived level of knowledge concerning each technology, and any comments he or she wished to make concerning each technology.

The above information was then used to calculate figures of merit (FOM) for each technology. On the basis of the FOM the technologies were then ranked. The funding information was used as the basis for recommendations of future funding--namely, whether the funding for each program should be decreased, remain the same or be increased relative to the President's FY82 budget.

TABLE C-1

R,D&D PROGRAMS

Energy Related Supply Programs
- Magnetohydrodynamics (FE)
- Geothermal
- Hydropower
- Electric Energy & Storage Systems
- Solar Power Technology (CE)
- Magnetic Fusion (ER)
- Uranium Resources Assessment (NE)
- Uranium Enrichment - Centrifuge (NE)
- Uranium Enrichment - Advanced Isotope Separation (NE)
- Conventional Reactor Systems (NE)
- Liquid Metal Fast Breeder Reactor
- Clinch River Breeder Reactor
- Light Water Breeder Reactor
- Fuel Cycle R&D
- Nuclear Waste - Commercial (NE)
- Nuclear Waste - Defense (DP)

Liquids and Gas Related Supply Programs
- Mining R&D (FE)
- Advanced Technology (FE)
- Coal Liquefaction (FE)
- Surface Coal Gasification (FE)
- In Situ Coal Gasification (FE)
- Enhanced Oil Recovery (FE)
- Enhanced Gas Recovery (FE)
- In Situ Oil Shale (FE)
- Biomass Energy (CE)
- Alcohol Fuels (CE)

TABLE C-1 (continued)

Conservation and Improved End-Use Utilization Programs
- Coal Combustion Systems
- Heat Engines and Heat Recovery
- Fuel Cells (FE)
- Buildings & Community Systems
- Industrial Conservation
- Transportation Conservation
- Multi-Sectors Conservation (CE)
- Solar Applications for Buildings
- Solar Applications for Industry (CE)

Science and Technology Programs
- Energy Supporting Research (Overall)
- Basic Energy Sciences (Overall)
- Nuclear Sciences
- Materials Sciences
- Chemical Sciences
- Engineering, Math & Geosciences
- Advanced Energy Projects
- Biological Energy Sciences
- Climate and CO_2 Research
- Technology /Assessments
- University Research
- General Science (Overall)
- High Energy Physics
- Nuclear Physics
- Nuclear Medicine
- Environment and Safety
- Health & Environmental Research

TABLE C-2

EVALUATION CRITERIA FOR ENERGY R,D&D PROGRAMS

1. Technological Potential/Risk

Definition: Likelihood that the R,D&D Program will, within a reasonable period of time, result in technical success.

High (3) - Very good likelihood of technical success. (in other words, low technical risk)

Med. (2) - Reasonable chance of technical success. (in other words, moderate technical risk)

Low (1) - Only a slim chance of technical success. (in other words, high technical risk)

2. Urgency

Definition: Considering both the time period before which the technology is needed and the lead time for development, how urgent is the R,D&D program.

High (3) - Program must be started now (or continued) at a high level of effort.

Med. (2) - Program could be carried on at a moderate level now or, alternatively, delayed for 5 years or possibly 10 years.

Low (1) - There is no urgency in the program and it could be delayed for 10 years or more.

3. Economic Potential

Definition: Likelihood that the technology, when it is developed, will be economically competitive with then existing technologies providing energy in the same form or available alternative substitutable sources (note: assume development is completed no later than the year 2000).

High (3) - Economics are likely to be very competitive.

Med. (2) - Economics are uncertain or are likely to be marginally competitive.

Low (1) - Economics are likely to be non-competitive.

4. Benefit/Cost

Definition: Considering the size of the R,D&D investment needed to develop the technology, how substantial is the impact of the development of the technology in terms of end-use energy produced or saved.

High (3) - Less than $1 billion of total R,D&D investment required for each 1 Quad of energy produced or saved annually (in the year 2000).

Med. (2) - Between $1 billion and $10 billion of total R,D&D investment for each 1 Quad of energy produced or saved annually (in the year 2000).

Low (1) - More than $10 billion of total R,D&D investment for each 1 Quad of energy produced or saved annually (in the year 2000).

5. Energy/National Security

Definition: How significant is the energy technology from the standpoint of displacing or substituting for insecure foreign energy sources (primarily oil).

High (3) - Will displace or substitute for 2.0 million barrels/day or more (about 4 quads/yr) or oil equivalent by the year 2000.

Med. (2) - Will displace or substitute for 0.5 to 1.99 million barrels/days of oil equivalent by 2000.

Low (1) - Will displace or substitute for less than 0.5 million barrels/day of oil equivalent by 2000.

6. Safety, Security, Health and Environmental Impact

Definition: Both from the standpoint of the general public and the worker, the degree to which the technology is safe, secure, healthy and has minimal (or even positive) environmental impacts.

High (3) technology results in improved safety, health and environmental impact.

Med. (2) technology would have some adverse safety, health or environmental consequences, but not serious ones considering potential control measures.

Low (1) technology has serious safety, security, health or environmental problems.

7. Federal RD&D Role

Definition: considering the RD&D support for the technology that is likely to come from industry, how important to timely commercialization is Federal RD&D support.

High (3) - heavy Federal support is essential since because of the risk or long development period, industry support will be small.

Med. (2) - some Federal support is needed to complement industry efforts or to ensure timely development.

Low (1) - little or no Federal support is needed since industry efforts are likely to be adequate.

ADDITIONAL EVALUATION CRITERIA FOR SCIENCE AND TECHNOLOGY BASE PROGRAMS

Most of the above criteria are not directly applicable to evaluating DOE Technology Base programs. The benefits of these basic and applied research and engineering development activities must be measured against different criteria for obvious reasons. The following criteria are to be used for evaluation of the science and technology programs listed in Attachment 4D:

8. Scientific Potential

Definition: degree to which the research program will advance scientific knowledge or contribute toward maintenance of American scientific leadership and achievements in a respective field and, therefore, represents an important national trust.

High (3) - Very likely to produce significant advances in scientific knowledge on important new frontiers of science.

Med. (2) - likely to add substantially to fundamental knowledge in relatively developed and mature fields.

Low (1) - not likely to add substantially to new knowledge.

9. Inventive Potential (Risk/Benefit)

Definition: likelihood that the R&D program will over the long term directly produce breakthroughs, discoveries, or inventions in energy production, usage, or conservation which have significant economic, social or environmental benefits and, thereby, justify the risks/costs of the applied science and engineering research efforts.

High (3) - very likely that the R&D program will directly result in energy developments with significant economic, social, or environmental benefits over the long-run.

Med. (2) - likely that the program will at least break even in producing energy developments with economic, social, and environmental benefits over the long-run.

Low (1) - not likely to produce energy developments with direct economic, social, or environmental benefits.

10. Mission Impact

Definition: degree to which the R&D program supports or underwrites the success of DOE technology development programs by providing the technology base for understanding fundamental working properties of the technology, solving known and unanticipated engineering development problems, and transferring new engineering knowledge to other energy applications and missions.

High (3) - program provides essential research and engineering support for critical energy technology development missions and goals.

Med. (2) - program provides general support with widespread applications to technology development missions or areas with less critical problems or secondary missions.

Low (1) - program does not directly support technology development programs, but may have general applications.

The following two RD&D program criteria are applicable—to the science and technology base programs and are to also be used in evaluating the science and technology base programs.

2. Urgency

Definition: same as RD&D criterion Number 2 above

7. Federal Role

Definition: same as RD&D criterion Number 7 above

APPENDIX D

ENERGY RESEARCH ADVISORY BOARD
DISSENT TO RECOMMENDATIONS WITH RESPECT
TO CLINCH RIVER BREEDER REACTOR

EXECUTIVE SUMMARY

Cancellation of the Clinch River Breeder Reactor Project at this time would not only result in time loss of investment of over $1 billion already incurred to date, but would also dissipate the hard-won technology capability already developed in the U.S., probably for the remainder of the century. Even if one accepts the argument that the breeder reactor program would only provide a useful option for energy generation sometime in the future, it is still necessary to complete the Clinch River Project in order to actually demonstrate this technology in the U.S. licensing and safety environment. Proven technology does not exist without an actual demonstration of acceptable safety, reliability, and operability. Although it is obvious from the achievements of the French, Japanese, British and Russian programs that sodium-cooled fast breeder reactors are practical, it has not been demonstrated that such plants can be designed, built and operated by U.S. technology and industry within the constraints imposed by domestic safety and licensing standards. The consideration of technology demonstration and preservation of U.S. presence in the worldwide breeder development program requires that the CRBR project be rapidly completed.

BASIS OF DISSENT

The energy future of the U.S. is subject to so many variables that no one can adequately predict what course the future will take with respect to energy. We do not know with any certainty how much energy will be used in 2000, for example, or what effect this will have on the growth of our economy.

It is also far from clear what quantities of the various fuels will be available. The U.S. must be prepared to cope with such undesirable events as partial or total cut-off of imported oil.

Electricity is a uniquely flexible form of energy. The transmission and distribution systems can be used to accommodate any source of generation, thus utilizing the energy source available at the time. The electricity can be transmitted to almost any desired point of use. This would be particularly useful in the event of disruption of energy sources due to any cause including enemy action.

The most available sources of energy, coal and uranium, can be best used to produce electricity. A larger part of U.S. energy needs could be supplied by electricity. It could be used for almost all space heating and provide much of the process energy required. This could be done in a more energy efficient and environmentally satisfactory way by the use of heat pumps.

It is predicted by the DOE that from 36 to 50 percent of the primary energy in 2000 will be used for the generation of electricity. It is probably possible to accomplish this, almost entirely by burning coal, but it almost certainly would not be the optimum choice on either economic or environmental grounds. There are clearly some undesirable health effects from burning coal and these should be minimized.

If one assumes that the upper end of the DOE 2000 LWR capacity projection of 200 GW occurs, this would require committing about 50 GW between now and 1990. Most, if not all of these reactors would be committed between 1985 and 1990. If there is about 900 GW of generating capacity in 2000 and the growth rate is 3.5 percent per year, then 31.5 GW plus replacements will be committed per year by 1990. It would seem reasonable for the nation to be in a position to have as much as 20 GW per year by nuclear plants. While it is possible that many of these plants could be coal burning, there are enough potential problems with coal plus the possible economic advantages of nuclear, that we should be able to take advantage of that option. This might amount to 243 GW of nuclear plants being committed between 1990 and 2000.

A 3.5 percent growth rate after 2000 would required additional capacity of about 540 GW, plus replacements, to be committed for operation by 2020. If half of this is LWR's then by 2010 about 4.6 million tons of uranium would have been committed for a 30 year life. If the life is 40 years, then 4.9 million tons would have been committed by 2010. (With a 40 year life there would be fewer replacements by 2020.)

According to a recent DOE report, there is a 95 percent confidence that there is 3,875,000 tons of U_3O_8 in the U.S., at a forward cost of $100 per pound. This includes reserves as well as probable, possible and speculative reserves.

Forward costs are operating and capital costs in 1980 dollars that would be incurred in producing the uranium; they exclude income taxes, profits, cost of money and sunk costs. The market price that would support a 15 percent rate of return has been estimated to be 1.4 - 1.6 times the forward cost per pound of U_3O_8.

It should be remembered that if there is the demand for uranium that approaches the amount potentially available the price rises accordingly.

The U.S. also has to a considerable degree a contractual, political and moral obligation to supply a considerable amount of uranium to industrial and developing nations.

The breeder should start being deployed in a significant way by 2010 or before as it is by no means assured that we would otherwise have the uranium required.

If reactors can be built in the time that is technically possible and if fewer design changes are made during construction, costs can be drastically reduced. This would make them the clear choice from the point of view of economics. To be able to take advantage of this may require deployment of breeders by 2010.

Even if breeders are not required due to the lack of uranium for LWR's, it may well be desirable to deploy them on economic grounds. The economics of the LMFBR compared to the LWR using break-even analysis has been extensively examined by various U.S. groups. The majority conclusion is that the break-even could occur around the year 2000 at an equivalent 30 year levelized price of uranium of about $50 - $150 per pound, in 1980 dollars.

The capital cost of breeders is higher than that for LWR's but the fuel cost is lower.' This provides a good hedge against inflation as the capital costs will be a larger fraction of the kilowatt-hous cost and will remain constant. The longer the lifetime used in the evaluation, the more favorable for the breeder.

Recent cost benefit studies, using econometric models, have shown that benefits measured in hundreds of billions of dollars would accrue from early as opposed to late introduction of the LMFBR.

There has been no even marginally commercially successful reactor without a previous demonstration plant having been built. Those involved with the reactor development program believe that a demonstration plant is essential. There will be many things that will not work as well as would be desired when they are put together in a complete reactor system. The information learned from such a demonstration will lead to far better second and subsequent generation plants.

No U.S. reactor has even been built with a single scale up as large as would be represented by the scale up from FFTF to a 1000 MW reactor.

The major reason for success in both the Naval nuclear and the LWR program was that in each case there was a reactor being built which provided a focus for the research effort.

The refocusing of a broad range R&D program, even one already focused on the needs to build a plant, will be greatly improved as the result of data obtained in the design, construction and operation of a demonstration plant.

One of the principal reasons for the success on the LWR's has been the infrastructure, suppliers of equipment and services, that had been created and nurtured. Cancellation of the CRBR will cause a break in the industry continuity and many suppliers may be reluctant to get back into the breeder business.

If CRBR is not continued, then it will have to be replaced by another demonstration plant. The size could be somewhat but not much larger. This would require many additional years and far more money. If CRBR is completed the next plant can be built for considerably less than it would otherwise cost.

To date, there has been $1.148 billion spent on CRBR, $246 million of components have been delivered and $352 million more are on order. There are 3200 people working on this project and design is 86 percent completed.

The design of CRBR is as advanced as any in the world. The design techniques and safety studies are more advanced than those in any other country. The CRBR can accommodate changes required to demonstrate the LMFBR system, including alternate fuel systems.

In fact, the recently completed conceptual design study (CDS) by the DOE which assumes construction and operation of CRBR, contains relatively modest changes to the basic CRBR design. For example, the 1000 MW CDS plant would have the same core and IHX design concepts, and its containment would be based on the same design philosophy as CRBR.

Although the fuel handling systems of each plant are quite different, other CDS reactor components only reflect modest extension of CRBR design experience, such as reactor vessel piping with internal downcomers; shutdown heat removal system within the reactor vessel; four loops vs three; two stage coolant pump which retains the hotleg feature of CRBR; and flexibility to accommodate any one of three steam generator designs.

The CRBRP will serve as an important step in beginning the transition of the fast breeder reactor program from the technology development stage to the decision point of large-scale commercial utilization. The major objectives of the project are: 1) to demonstrate the technical performance, reliability, maintainability, safety, environmental acceptability and economic feasibility of the LMFBR central station electric power plant in a utility environment, and 2) to confirm the value of this concept for conserving important non-renewable natural resources.

Although paper studies, laboratory experiments, and component testing are essential steps in developing complex new technology, only the practical demonstration of the fully integrated systems can move it nearer to readiness for commercial use. The history of light water reactor development suggests that CRBR would be the first of probably two demonstration plants built in tandem before there can be sufficient investor confidence to make commercial deployment possible. Such tandem demonstrations will require about 25 years for design, licensing, construction, testing and demonstration of operating reliability and maintenance requirements. This would bring us to about the year 2007 before our nation is postured to commit additional breeders that would then begin to make their first energy contribution in about 2020. If Clinch River should be terminated, the entire program will stretch out at least an additional ten years.

With the risks of oil supply, the uncertainties of the environmental acceptability of massive additional use of coal, and the unknown about future uranium for LWR's, our nation can ill afford the risk of arriving at 2007 and not have the capability to deploy the breeder. It may not be needed until later, but if it should be needed then and not available, the consequences could be severe. Breeders will multiply the energy recoverable from our nation's uranium reserves by a hundredfold or more.

In dissenting from the majority vote of ERAB, the undersigned also feel that Clinch River suffered from the criteria used in voting and weighing procedures. Clinch River cannot possibly save energy by 2000, it will not replace oil by then, it has no economic potential during this century, all of which cause CRBR to receive low ratings in these categories. We do feel that it is an essential and integral part of the on-going LMFBR program which received high ratings, and CRBR should proceed with dispatch.

Respectfully submitted: John W. Simpson
Roland W. Schmitt
William S. Lee
Louis H. Roddis

ENERGY RESEARCH ADVISORY BOARD
ADDITIONAL REMARKS BY THOMAS B. COCHRAN
WITH REGARD TO THE CLINCH RIVER BREEDER REACTOR

In its initial evaluation of DOE energy R&D programs, at least two-thirds of the members of the ERAB agreed that the Clinch River Breeder Reactor (CRBR) has low urgency, low economic potential, low benefit-to-cost ratio and that funding should be reduced. In the final analysis three-quarters of the ERAB members recommended that the "[breeder reactor] demonstration be delayed until a future time" — a statement which clearly implies termination of the present CRBR project.

Four ERAB members have attached a six page dissent to the five sentences devoted to the CRBR*/ in this 61 page report, which evaluates 52 program areas covering all DOE energy R&D. Under normal circumstances, the report of the majority should respond to the points raised by the minority. Because ERAB was under an extremely tight schedule to complete this exercise, no time was made available to provide for a majority discussion of the minority view. Consequently, the following comments by one member of the majority are presented in order to provide some balance to the discussion of the CRBR issue.

URANIUM SUPPLY

In order to counter the majority view that "sufficient... uranium supplies exist to satisfy projected levels of electric demand for at least 40 years and possibly well beyond" (p. 56), the minority states that "no one can adequately predict what course the future will take with respect to energy" and then proceeds to present its own high nuclear growth scenario.**/ This has the effect of exhausting low cost uranium resources sooner than otherwise projected, thus making an earlier commitment to a breeder demonstration plant more persuasive.

The simple response to this argument is that when one is not ordering any new reactors, one is not going to run out of uranium. This, the current reality, is consistent with the low nuclear growth scenario of the most recent energy projection of the DOE Energy Information Agency's (EIA). It assumes no nuclear plants will be constructed beyond those where construction is already 10 percent complete. While this will probably be the most accurate of the EIA projections,*/ the following table shows that the minority estimate of nuclear plants built by 2020 (committed by 2010) is almost 2.5 times the EIA intermediate growth scenario and more than twice the nuclear capacity in EIA's highest nuclear scenario.

---

*/ Three of these five sentences (at pages 3, 27, and 56) summarize statements in the other two.

**/ If this approach were applied to all energy R&D activities it would make orderly program planning and this ERAB exercise meaningless.

YEAR	DOE-EIA INTERMEDIATE-CASE GWE	HIGH-CASE GWE	ERAB MINORITY GWE
1981	60	60	60
2000	175	195	200
2020	290	350	713

With its very high nuclear growth after 1990, the minority then argues that we will have committed 4.6 million tons of uranium by 2010 -- exceeding the domestic resources at a forward cost of $100/lb. The minority has conveniently ignored a) any reduction in LWR uranium requirements through increased fuel-use efficiency and reduced enrichments tails with advanced technology (30% to 50% improvements have been projected);**/ b) any improvements in uranium mining technology over the next 30 to 60 years; c) the more robust world uranium resource pictures;***/ and d) the availability of higher cost (lower grade) resources, domestic and foreign.

To further exacerbate the uranium supply picture, the minority implies that utilities will not build a nuclear plant in 2010 unless the uranium for all plants operating in 2020 is assured through 2050. This conveniently ignores the world experience with breeders that will be accumulated between now and 2010 that will permit prudent decision making regarding the need for and timing of commercial breeder introduction.*/

---

*/ It should be noted that DOE and its predecessor agencies have consistently overestimated total energy, total electric, and nuclear electric energy growth during the past eight years.

**/ DOE, NASAP Report, DOE/NE-0001, Executive Summary, June 1980, p. 11.

***/ Two of our closest allies, Canada and Australia, are major export countries. In part because of competition from cheaper, higher grade foreign uranium resources, the domestic uranium producers are currently seeking protective import restrictions.

Properly framed, the uranium supply argument is subsumed in the larger question of when the breeder will become economically competitive with the LWR. The minority claims "most US groups estimate the uranium break-even price at about $50-$150/lb (1980 dollars." This claim is incorrect. The range in the most recent analyses is $150/lb to $400/lb.**/ With more credible assumptions regarding the growth rate in nuclear capacity and the capital cost difference between LMFBRs and LWRs, the breeder is unlikely to be economically competitive with conventional reactors until well into the next century, if ever.

More important than the issue of whether the breeder will ever be economical is whether the US can afford to wait a decade before reassessing whether to commit to a demonstration plant. The current economic outlook of the breeder strongly favors delay.***/

SUNK COSTS VS. FORWARD COSTS

The minority argues that cancellation of CRBR will result in the loss of over $1 billion investment already incurred. This is a familiar argument, but one based on bad economic theory. One should weigh forward benefits against forward costs and not sunk cost to evaluate the wisdom of proceeding.****/ Current estimates of the total project cost are in the range of $3.2 billion (1981 dollars) making the forward cost in excess of $2 billion,*/ an amount well worth saving, or applying to other more cost effective energy R&D programs. Furthermore, the $2 billion forward cost estimate is unrealistically low.**/

---

*/ The French will have operated the commercial size Super Phenix breeder reactor for some 25 years by 2010. Also, the US breeder program, even without the CRBR, would be one of, if not the, largest energy R&D efforts in the world.

**/ DOE, NASAP Report, DOE/NE-0001/5, June 1980, p. 42 gives $120 to $200/lb as the indifference price for LMFBR costing 1.25-1.5 times LWR as compared with a 15% improved LWR. Brian G. Chow, "Economic Comparison of Breeders and Light Water Reactors, Pan Heuristics, 23 July 1979, p. 74, projects $150 to $438/lb.

***/ In 1990, we will be in a far better position to judge the economic outlook for breeders based in part on the additional French experience. We will know also whether the "second coming" of nuclear power in the US is real or imaginary.

****/ The minority also takes no credit for R&D benefits obtained from $1.03 billion sunk of which only $608 million represents hardware completed or on order. Furthermore, if the project were cancelled part of $353 million (for hardware on order) would be recoverable.

DEMONSTRATION OF SAFETY AND LICENSING

The minority claims that "even if one accepts the argument that the breeder reactor would only provide a useful option in the future it is still necessary to complete the Clinch River Project in order to actually demonstrate this technology in the US licensing and safety environment."***/ Safety and licensing requirements, however, are evolving and would likely change drastically by the time the breeder is commercialized.****/ There is little to be gained by demonstrating present breeder technology in the current licensing and safety environment. Even if one accepted the minority view that one might wish to deploy breeders in 2010, it would make far more sense to demonstrate licensing in 2000, some 20 years hence.

---

*/ The latest total CRBR project cost estimate is $2.88 billion (1980 dollars), based on 8% escalation rate and a completion date of 1988. By way of comparison the entire project was estimated in 1973 to cost $700 million.

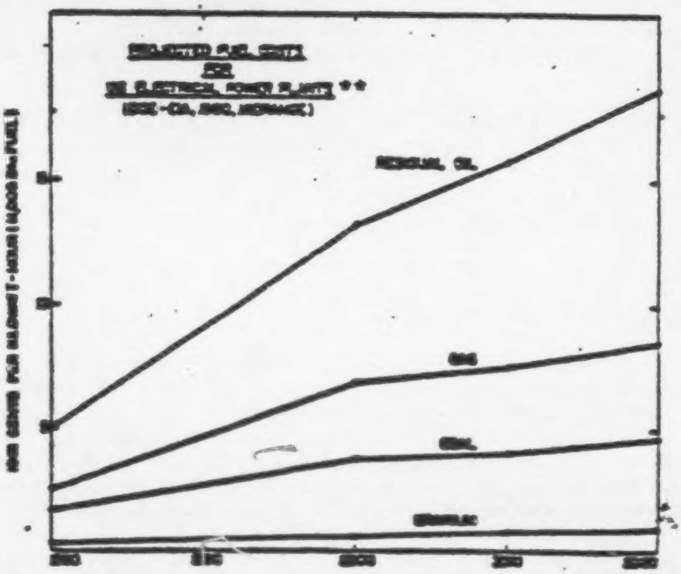
**/ It is based on a) the unlikely prospect that DOE will obtain approval from NRC to begin site work prior to completion of safety and environmental reviews, b) estimates of the construction schedule and cost that do not reflect the experience of most nuclear projects of this type, and c) the assumption that the Clinch River site is suitable. With regard to the last, NRC may require an alternate site, in part because of unfavorable meteorology and post TMI limits on population density. In this event the project would be set back an additional 4 years at an added cost of $1.7 billion.

***/ This argument would have been a bit more persuasive were it not for the fact that DOE has just requested a licensing exemption for the NRC (Letter from DOE Secretary Edwards to Nunzio Pallidino, Chairman NRC, Nov. 30, 1981) in order to commence early site preparation work prior to completion of the required safety and environmental reviews and hearings. This request, if granted, would enable DOE to initiate site work prior to the next CRBR budget review by the Congress.

****/ Anyone who seriously questions this need only examine the effect the TMI accident has had on the licensing requirements in effect just two years ago.

CONCLUDING REMARKS

The ERAB report raises the question of whether "federally-sponsored nuclear programs are receiving a larger portion of funding completely out of line with the expected nuclear share of the US energy mix during the next few decades." In the President's FY 1982 energy R&D budget $875.6 million -- some 31% of all R&D funds exclusive of the Science and Technology Base (see Table III-D) -- is devoted to breeders and advanced uranium enrichment technologies.*/ These activities can be seen, as viewed from the market place, as attempts to reduce the impact of rising uranium prices. The figure on the next page suggests that the problem is not with the uranium but with oil. When one also realizes that a) we can safely defer a commitment to the CRBR, b) the LMFBR base program expenditures can be substantially reduced once the program is refocussed for the longer term, c) a 50% reduction in the price of uranium enrichment will reduce electricity prices by only 0.1¢/kwh, d) our national security problem is with oil, not uranium, and e) improvements in energy productivity have proven to be the more cost effective means of providing additional "supplies," there can be little doubt that DOE energy R&D priorities are misplaced.



---

*/ $875.6 million represents the sum of the budgets for the LMFBR Base, CRBR, Breeder Fuel Cycle R&D, Uranium Enrichment R&D (Centrifuge and AIS), and the LWBR (See Table IV-A, pp. 26).

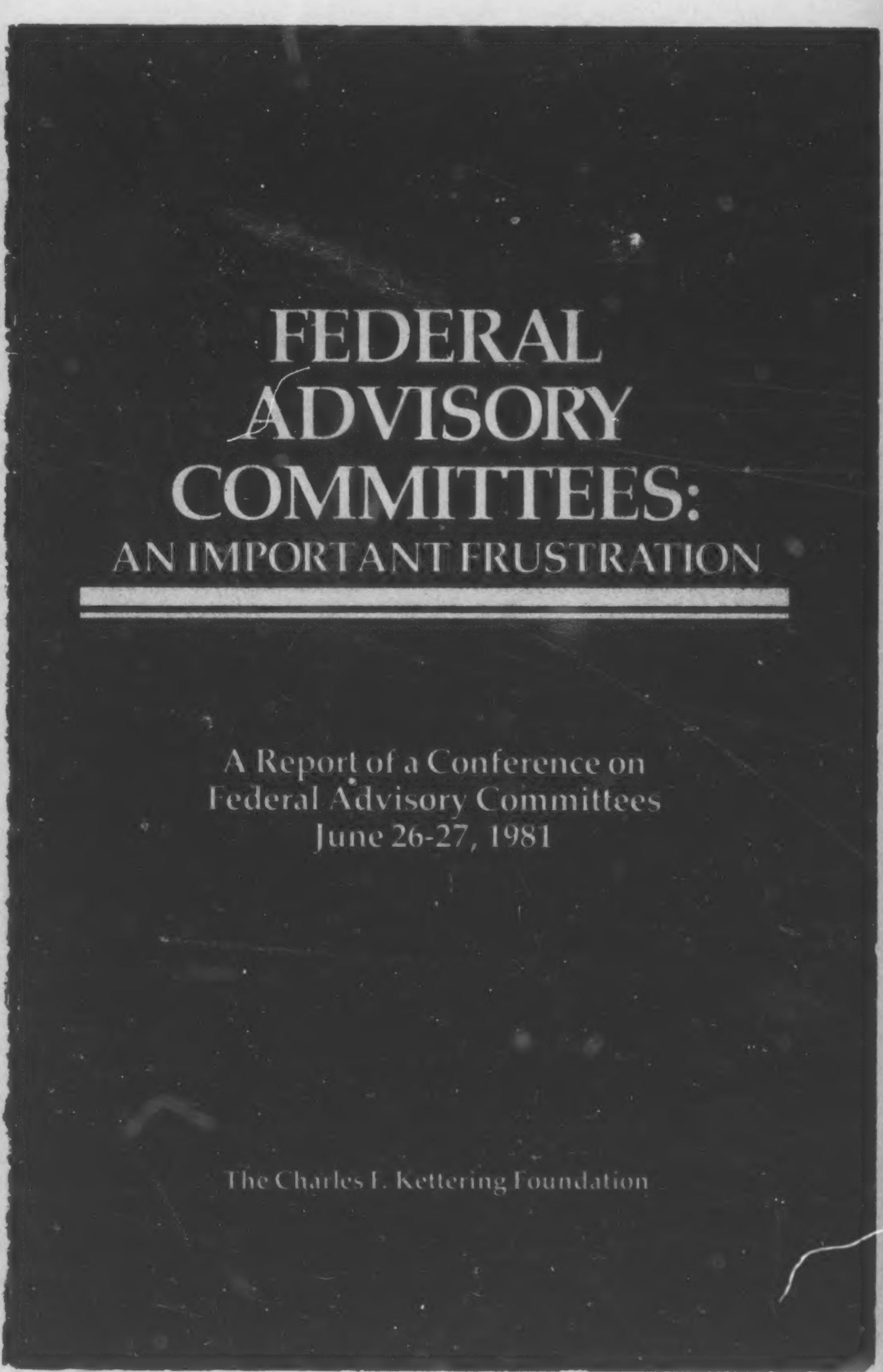
**/Frank von Hippel, Testimony before the Subcommittee on Energy Conservation and Power, of the House Committee on Energy and Commerce, October 5, 1981.

DISSENT TO THE RECOMMENDATION WITH RESPECT TO ELECTRIC AND HYBRID VEHICLES

Electric and hybrid vehicle technology is high risk, but promising, and its continued development would well serve the long term national interest. The technology is high risk because the economic viability of electric and hybrid vehicles has not been demonstrated. It is promising because of the rapid advances in the offing for performance improvements and cost reductions of electric drive systems based on power semiconductor devices, and because of continued progress in battery technology. And, it would serve the long term national interest because it directly addresses the problem of total dependence of the US on liquid fuels for personal transportation services.

Under normal circumstances it would be expected that development of electric vehicle technology would be pursued at a reasonable level by the automobile industry. However the present condition of the industry is such that it cannot be expected to pursue this high risk development without some Federal support. Termination or sharp reduction of the Federal program at the present time would significantly delay electric vehicle development and substantially increase the risk that this technical option would not be ready at the time when it might be needed.

Respectfully submitted: Roland W. Schmitt



FEDERAL ADVISORY COMMITTEES:
AN IMPORTANT FRUSTRATION

A Report of a Conference on
Federal Advisory Committees
June 26-27, 1981

The Charles F. Kettering Foundation

Federal advisory committees are a source of frustration to just about everybody involved:

- **the members**
- **the agencies**
- **the White House**

Although they are a frustration, they have become an integral part of the policymaking process. Today, even the most vocal critics of advisory committees recognize that government must be able to get advice from knowledgeable and experienced citizens from all sectors of society. Advisory committees are an important element in making government responsive.

One of the conclusions of the conference was that a wider group of federal advisory committee members (past and present) should be involved in a thorough reassessment of federal advisory committees. The "advisory committee system," said participants, "is perhaps the most 'underutilized' network linking government and citizens."

The case for the citizen's role in public policy can be made easily, and the issue runs deep throughout American tradition.

In classical democratic theory, participation is both "right," in that it gives people just control over their destinies, and it is beneficial, in that it is educational and thereby heightens appreciation for the common good. Citizens have been taking control and participating in a myriad of ways.

The Roots of Federal Advisory Committees

The use of advisory committees goes back to President George Washington, who brought together a group of citizens to help quell the "whisky rebellion."

More recently, advisory committees gained broader popularity during the Kennedy and Johnson administrations when Great Society projects ushered in the new era of citizen involvement. During this period, the federal government sought to include the poor and disenfranchised in decisions affecting their lives.

However varied the use and makeup of these committees over the years, Congress and the presidents have shaped the advisory committee system into an important resource for making public policy.

Public participation through federal advisory committees has grown dramatically since the early sixties, leading to a system in which, today, 25,000 people advise the government on everything from nuclear power to child welfare. Citizens, working with government professionals, have helped to shape policy, to advise on scientific and social research, and sometimes to build a consensus among conflicting viewpoints.

A Political Paradox

Perhaps the most important and complicating factor in the operation of government advisory committees is that they operate as part of a political milieu. The laws and the agendas a particular administration adopts reflect both the administration's desire to use advisory committees and its need to maintain public credibility. Advisory committee members often learn that their experiences working with the government can be as diverse, as exciting, and even occasionally as disappointing as our system of government itself.

This kind of participation, states David Mathews, president of the Charles F. Kettering Foundation, has worked to add a new dimension to the precept that governments exist by the consent of the governed. "Informed participation, not simply participation," is the cornerstone of representative democracy, Mathews maintains.

In June of 1981, the Kettering Foundation sought to open a window into the world of federal advisory committee service. Fourteen citizens serving on federal advisory committees were brought together with top-level federal officials who work with advisory panels. They came to probe the problems and the effectiveness of this form of participation.

The purpose of this report is to present the frustrations and concerns from a number of perspectives and to reflect the search for solutions.

The questions are being debated in a review of the effectiveness of the federal advisory system by:

the members
the agencies
the White House

Should a New President and New Cabinet Officers Receive Resignations from All Advisory Committee Members?

Members of advisory committees are often associated with a political viewpoint. This fact alone can throw an advisory group's work into limbo when there is a change of administrations. Some officials question whether many advisory committees are really needed and note that the government can obtain ad hoc advice through other kinds of public participation without the encumbrances and expense of establishing committees. But what federal officials are most frustrated by is government's lack of control over advisory committees.

Top administrators cannot control public access to the groups they hope will frankly consider issues and quietly offer advice. Often they cannot guide the advice they receive or forecast the public furor it may create. There is fear that a federal advisory committee can create its own constituency for a special point of view and generate a groundswell of public opinion before the government has a chance to consider all the alternatives. Several of the conferees agreed that while such a development may be exciting and interesting to the public, it is usually ineffective.

"If an advisory committee is independent, truly independent so it can speak and advise with its own insight, then it may not have access to governmental decisionmakers because those governmental decisionmakers will feel the committee is a 'loose cannon,' a 'wild card,' not loyal. On the other hand, lack of independence may lead to lack of credibility with the constituencies that need to be represented and whose ideas need to be reflected in decisionmaking," said one participant at the Kettering-sponsored meeting.

Some at the conference argued that there is a need for citizen advocacy in government. "Advisory committees are an extension of input into government from citizens—a necessity for a democracy. To gear the work of a committee to the issues without creating an advisory-for-advocacy relationship on the issues which the committee is asked to address is to weaken the whole process."

Last November's election gave conference participants the most recent opportunity to consider what happens to advisory committees when there is a change of administrations. There is concern about a conflict between the political beliefs and goals of the committee members and those of a changed administration, and the new administration must be concerned about realistic political questions such as how to reward campaign workers.

"One department considered asking for resignations from all members of its advisory committees," stated a government representative. An alternative course of action would be to stagger terms for advisory committee members. The latter would encourage continuity while allowing a new administration to have influence over some appointments.

Is it politically naive to expect an advisory committee whose members are inconsonant with an administration to be effective? "I suggest that the amount of resources committed to an advisory committee, the support of its findings, and the general satisfaction with the process will be greatly enhanced if the new administration can appoint all of the members," said one federal participant.

What Controls the Operations and Spending of Federal Advisory Committees?

In 1980, the government spent $88 million to operate 865 advisory committees. There were 52 presidential committees, 229 authorized by federal agencies, and 612 authorized or directed by law.

The 1972 Federal Advisory Committee Act (FACA) outlines the requirements governing the establishment and operation of committees that advise the federal government. While this law does not require or advocate that such committees be established, it states that if the president or an agency seeks advice outside of government on a continuing basis, the group's membership must be "fairly balanced" to represent a variety of views and that the committee must publish notice of its meetings and make those meetings "open to the public." The law, intended by Congress as a check on the possible abuse of public funds, was first proposed because some government officials had been using committees of experts brought together by private industry and private interest groups. It was designed, in part, to prevent the business world from exerting undue influence on government policies and on rules and regulations from which it stood to gain financially.

Has the Open Meeting Become a Two-Headed Dragon?

Under the Freedom of Information Act (FOIA) advisory committees are obliged to fill any request for documents pertaining to their operation and deliberations. The Government in Sunshine Act (GISA) further requires that federal advisory committee meetings be open to the public, subject to specific exceptions.

Federal representatives at the conference said the requirements of these three laws can make federal officials reluctant to establish advisory panels in the first place. When the government faces a controversial decision, they pointed out, it is awkward and frustrating to discuss every aspect of a problem in public.

"Why do I hesitate to create a federal advisory committee?" one conferee asked. "The open meetings, the possible application of the Freedom of Information Act, the requirement for balanced representation . . . the use of the *Federal Register* and the creation of, perhaps, a dragon that will not die naturally. Of these the most serious consideration is the open meeting. Cabinet officials are concerned about whether a report drafted 'in the glare of publicity' will be frank and useful."

What is the Relationship Between the "New Federalism" and Federal Advisory Committees?

Because the current administration has proposed transferring more government responsibility to the states, some of the federal officials pointed out that the country's large system of federal advisory groups may not remain relevant. The administration officials cited hearing demands for a New Federalism from both Democratic and Republican voters. One federal official suggested: "So what does all this mean to advisory committees? If the President cuts back on government, if the role of government shrinks, will the role of citizen advisory committees need to shrink also?"

Does Government Let the Citizen Advisors Know What is Expected of Them?

Before committee members can consider their effectiveness, it is important, the conferees agreed, that they decide why they exist and how they wish to proceed. A clear statement of mission and responsibility is important. Advisory bodies should have an idea of their limitations as well as their goals and avoid working under the disadvantage of unrealistic expectations. Committees do not want to be asked questions if agencies cannot accept the answers.

One federal committee member said he found his group "important, but not very effective. The committee was appointed, I assume, because somebody thought that it would be a good idea to have an advisory committee. The problem was, we never had any kind of agenda," he explained.

Lines of communication must be established between the agency head and the advisory group. Many conferees believed there is no substitute for communication with and access to top-level federal officials. A committee needs to understand how its mission relates to government's agenda.

Can We Define "Fair Balance" in Selecting Advisory Committee Members?

An advisory committee's membership is a key factor. The law (FACA) requires a membership which is "fairly balanced in terms of points of view represented and the functions to be performed." There is little guidance or help given to appointing officials on how to achieve "fair balance."

Current committee members said people should be selected for their competence and expertise, and that it is important to have diverse representation—generalists as well as specialists. The stature and experience of members on an advisory panel can be a factor in winning the confidence of federal officials, Congress, and the public.

A number of conferees suggested that an attempt to achieve ethnic or political balance on a committee can present problems. Certainly, if political reward becomes the most important criterion, the appointee's ability to contribute effectively is compromised. On the other hand, political appointees are valuable; as representatives of a particular administration, they lend credibility to and spark interest in the committee's work. Symbolic inclusion of members from poor and minority groups, some conferees believe, is not a guarantee that the people selected represent those constituencies.

Who Controls the Staff and the Budget?

Relations between a committee and its staff were described at times as frustrating because of the staff's need to serve two masters.

"The staff is often provided by the agency that is soliciting the advice, and that agency generally has a notion of what the advisory committee ought to do. Yet the advisory committee would like to keep some independence and simply not be the slave of an agency," stated one committee member.

Advisory groups can be rendered ineffective if they have no control of their budgets. Conferees said it takes no time at all for government officials to figure out the most effective way to stop a flow of information they deem contrary to their interests. One advisory committee member outlined a typical scenario: "The budget comes to us as the agency decides it will come. As a result, we started out holding six meetings a year, reduced to five meetings a year, reduced to four meetings a year. We are now down to three meetings a year."

Can an Advisory Committee be Effective?

When a committee makes recommendations or a report, it ought to receive a point-by-point response from the agency. Committees need to be "plugged into" the agency's policymaking process. One of the conferees said his committee made certain its work would be noticed by sending a copy of the discussion and recommendations from each meeting to the congressional panel that established the group, as well as to the administrator they were advising: "We insisted from the very beginning that we would not be an effective committee unless we got feedback from the administrator about what he would do with our recommendations."

By its assertiveness, this committee ensured that as many as 70 to 75 percent of its recommendations were accepted and used. Timidity in expressing opinions can render an advisory committee ineffective more quickly than anything else. "The worst fault of a committee is not being courageous enough."

The quality of the chairman's leadership and the ability of the committee members to work together were concerns heard throughout the conference discussions. Orientation, training, and education for federal officials and committee members were also identified as key elements for avoiding the frustration of having work rendered ineffective.

Can a Citizen be Successful?

Despite the barriers to a committee's functioning smoothly and presenting its point of view to the government effectively, it was clear that at least a few committees have been successful.

"We met every six weeks, not by law, but because we wanted to," explained one participant. "Subcommittees met as often as every three weeks. The committee members were very busy people, people who felt, because of the effectiveness of what they were doing, they wanted to do more and more."

What Next?

At the conclusion of the conference, it was clear that those who serve on advisory panels have a strong belief in the value of such groups.

At the same time, government officials expressed concern about the difficulty of working in an atmosphere of total public access. Some thought certain legal requirements seemed to impede rather than promote public participation. Others believed the problems of openness and access, power and control, communication and the timing of decisions, length of terms, committee leadership, staff, budget, and accountability were better resolved through administration and management by top-level officials committed to the process than through the creation of more laws.

It was clear from this initial discussion that there is a need to search for ways to improve the federal advisory committee system. Attention needs to be focused on how to achieve balanced membership and a diverse mix of credible views on committees. Committee members need to be informed about how they can function more effectively. Government officials need to be educated about how they can manage the committees with greater flexibility and sensitivity.

With this discussion and the research that is under way, the Kettering Foundation will focus on improving the functioning of federal advisory committees as one means of achieving better public policy.

PARTICIPANTS

Nicholas Ashford
Cambridge, Massachusetts
National Advisory Committee on
Occupational Safety & Health

Jane Belau
Minneapolis, Minnesota
Citizen Participation Task Force
Department of Health, Education and Welfare

Alan Beringsmith
San Francisco, California
Environmental Advisory Committee
Department of Energy

Daniel E. Berry
Dayton, Ohio
Charles F. Kettering Foundation

Jackson B. Browning
New York, New York
Environmental Advisory Committee
Department of Energy

Thomas J. Campbell
Washington, D.C.
Department of Justice

Philip Caper, M.D.
Cambridge, Massachusetts
National Council of Health Planning
and Development

James Caplinger
Dayton, Ohio
Charles F. Kettering Foundation

Robert E. Daley
Dayton, Ohio
Charles F. Kettering Foundation

Sylvia Davidson
Portland, Oregon
National Council of Health Planning
and Development

Margaret Gover
Albuquerque, New Mexico
President's Council for Energy Efficiency

Susan Hawkes
Washington, D.C.
White House Office of Intergovernmental
Affairs

Ruth Hinerfeld
Washington, D.C.
President's Commission for a National
Agenda for the 80's

Helen Ingram
Tucson, Arizona
Committee for the Environmental Impact
Statement on the MX Missile

Charles C. Johnson, Jr.
Silver Springs, Maryland
National Drinking Water Advisory Council

Clementine Kaufman
Baltimore, Maryland
Consultant

James E. Kunde
Dayton, Ohio
Charles F. Kettering Foundation

David Mathews
Dayton, Ohio
Charles F. Kettering Foundation

The Honorable Lucille Maurer
Silver Springs, Maryland
Intergovernmental Advisory Committee
Department of Education

Mike Mitchell
Washington, D.C.
Senate Governmental Affairs Committee

Robert A. Neal, M.D.
Research Triangle Park, North Carolina
Federal Insecticide, Fungicide and Rodenticide
Act Scientific Advisory Panel

S. Anderson Pollard
Los Angeles, California
President's Committee on Mental Retardation

Clayton Record
Hemet, California
California Desert Advisory Committee
Department of the Interior

Russell Roberts
Washington, D.C.
Department of Health and Human Services

Megan Scribner
Washington, D.C.
Charles F. Kettering Foundation

Robert H. Tarr
Washington, D.C.
Department of Health & Human Services

Richard Wegman
Washington, D.C.
Consultant

Shelly Weinstein
Washington, D.C.
Charles F. Kettering Foundation

Cecilia Wirtz
Washington, D.C.
Office of Management and Budget

Private Sector Participation in Federal Energy RD&D Planning

A report prepared by the
Committee on Private Sector Participation
in Government Energy RD&D Planning

Commission on Natural Resources
National Research Council

NATIONAL ACADEMY OF SCIENCES
Washington, D.C. 1978

NOTICE

The project that is the subject of this report was approved by the Governing Board of the National Research Council, whose members are drawn from the Councils of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine. The members of the Committee responsible for the report were chosen for their special competences and with regard for appropriate balance.

This report has been reviewed by a group other than the authors according to procedures approved by a Report Review Committee consisting of members of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

This study was completed under Contract EY-76-C-02-2708-013 with the Department of Energy in April, 1978.

International Standard Book Number 0-309-02783-7

Library of Congress Card Number 78-60538

Available from

Printing and Publishing Office
National Academy of Sciences
2101 Constitution Avenue, N. W.
Washington, D. C. 20418

Printed in the United States of America

COMMITTEE ON PRIVATE SECTOR PARTICIPATION IN GOVERNMENT ENERGY RD&D PLANNING

Martin Goland, Chairman
    Southwest Research Institute
Arthur M. Bueche
    General Electric Company
Theodore L. Cairns
    E. I. du Pont de Nemours and Company, Inc.
William D. Carey
    American Association for the Advancement of Science
Dayton H. Clewell
    Mobil Oil Corporation (retired)
Peter T. Flawn
    University of Texas
Ralph E. Gomory
    International Business Machines Corporation
Milton Harris
    Consultant
Eric H. Reichl
    CONOCO Coal Development Company
Louis H. Roddis, Jr.
    Consulting Engineer
Abe Silverstein
    Republic Steel Corporation
Joseph C. Swidler
    Leva, Hawes, Symington, Martin, and Oppenheimer
Mason Willrich
    The Rockefeller Foundation

Staff

Winfred E. Berg - Special Projects Officer
George White - Executive Secretary
Martha L. Beard - Staff Secretary
Linda E. Jones - Staff Secretary

TABLE OF CONTENTS

	PREFACE	vii
	FRONTISPIECE	viii
	EXECUTIVE SUMMARY	1
CHAPTER I	INTRODUCTION	4
CHAPTER II	THE GOVERNMENT ROLE IN ENERGY RD&D	7
CHAPTER III	THE ERDA (DOE)/PRIVATE SECTOR RD&D PLANNING INTERFACE	11
	Energy Advisory Committees	15
	Determination of Future Technology Requirements	15
	Survey of Industrial In-House RD&D Activity	16
	Enhancement of Management Expertise	17
CHAPTER IV	INDUSTRY PERCEPTIONS OF THE ERDA/PRIVATE SECTOR INTERFACE	19
	Syn-fuels	20
	Nuclear Power	21
	Solar Power	22
CHAPTER V	LEGAL CONSTRAINTS TO DOE/PRIVATE SECTOR COOPERATION	25
	The Conflict with the Government's Effort at Openness	26
	Protection of Proprietary Information	28
	The Protection of Patent Rights	29
	Organizational Conflicts of Interest	30
	The Impact of Antitrust Considerations	32
	Concluding Remarks	34
CHAPTER VI	INSTABILITY AS A CONSTRAINT TO DOE/PRIVATE SECTOR COOPERATION	35
CHAPTER VII	THE RD&D PLANNING PROCESS	38
	The Energy RD&D Advisory Board	40
	Executive Committee	41
	Standing Advisory Committees	41
	Ad Hoc Advisory Panels	42
	Associate Members	42
CHAPTER VIII	CONCLUSIONS AND RECOMMENDATIONS	44
APPENDIX	AN ANALYSIS OF FIVE LEGAL PROBLEMS IN STRUCTURING PRIVATE SECTOR PARTICIPATION IN JOINT RD&D PLANNING	49

PREFACE

The primary objective of the present study, as defined in the National Research Council's original proposal to the Energy Research and Development Administration (ERDA) in June 1976, was to recommend an institutional mechanism to facilitate private sector participation in government planning of energy RD&D programs. Between the time the proposal was made and the initial meeting of the Committee in March 1977, the new Administration had indicated plans, previewed in President Carter's report to the Congress in January 1977, "The Organization of Federal Energy Functions," to make major changes in the organization of the federal energy activities and responsibilities. To keep the study relevant in the new framework, the Committee enlarged the scope and changed the primary focus of the study from the relatively narrow limits of original assignment to include the more complex question of government-industry relationships as they may affect the participatory planning process. The changes in federal energy organization included in recent "Department of Energy Organization Act" (42 USC 7101) and discussed in the study report, confirmed that this shift in approach was necessary.

The Committee recognizes that several study recommendations touch on very substantial legal issues. The perspective taken by the Committee in making these recommendations is that these issues present problems to the participatory energy RD&D planning process and must be addressed. The Committee does not presume that it has made an analysis of sufficient depth and scope to design solutions to these problems, which will require further analysis in depth by legal and regulatory experts.

"Energy is a pervasive and highly interrelated subject involving complex interactions between public and private sectors and among the numerous federal energy programs. The private sector plays the predominant role in meeting our energy requirements by providing the needed initiative, capital investment, know-how and labor."

- President Carter's Report to
  the Congress January, 1977,
  on "The Organization of Federal
  Energy Functions."

EXECUTIVE SUMMARY

Insuring the energy future of our nation involves both the private sector and the federal government, working in cooperation with state and local authorities. While reserving for itself certain options such as hydroelectric power from federal water projects, the government should establish a sound national energy policy that takes full advantage of available and emerging energy options, and cooperate with and supplement the efforts of the energy industry to make certain that our national energy needs are met. The government should include in this responsibility the sponsorship of a strong research and development program to develop new technological options. The delivery of energy, and the commercialization of new technologies are primarily private sector responsibilities. In the words of President Carter, "the private sector plays the predominant role in meeting our energy requirements by providing the needed initiative, capital investment, know-how and labor."

This study was commissioned by the Energy Research and Development Administration (ERDA) (now Department of Energy [DOE]) to appraise the effectiveness of the private sector/government planning interface, specifically with respect to their cooperative efforts to introduce new energy options for the future. The principal objective of the study is to recommend ways in which joint planning between industry and government can be made more effective in the areas of research, development, and demonstration projects (RD&D). Close coordination is essential if there is to be an effective relationship between DOE technological initiatives and private sector capabilities and needs, and if the technology is to be moved rapidly from the RD&D stages to practical application by industry.

Based on its studies, the Committee concludes that substantial improvement is needed in DOE/private sector interaction at both the planning and the program implementation levels. However, before this can be accomplished, a number of obstacles must be overcome. Significant legal constraints deter effective participation by representatives of the private sector in DOE planning activities. Some are imposed by legislation. Others arise largely from uncertainties and restrictive interpretation of provisions contained in current laws and regulations. The combined effect of these constraints is to reduce, or even eliminate, the opportunity for DOE to obtain needed advice from experts in the private sector, or to develop programs in such a way that they lend themselves to early commercialization of research results.

Among the legal disincentives are those derived from provisions of the Freedom of Information Act, the Government in the Sunshine Act, the Federal Advisory Committee Act, and the various laws relating to antitrust activities. The ability to protect proprietary data and trade secrets when such information is supplied to the government poses further complications. Issues relating to patent protection and program management practices also cloud the achievement of effective DOE/private sector collaboration.

While these laws provide the public protection against various abuses and should not be made less effective, the Committee believes that many of the legal constraints can be overcome if more definitive guidelines are established governing participation of experts from the private sector in DOE planning. Current laws and regulations should be re-examined to insure that they recognize the responsibilities and essential participation of the business community as a member of an effective energy partnership, while at the same time continuing to safeguard public interests and values with which the goverment is rightly concerned. The Secretary of Energy, in consultation with the Department of Justice, is urged to give early attention to the need for such a reconciliation.

The Committee also concludes that DOE would benefit from the establishment of a formal advisory Board reporting to the Secretary of Energy, with membership including experts with backgrounds in industry, academia, and non-profit institutions. This Energy Research, Development, and Demonstration Advisory Board, along with its associated Committees, would give advice on policy and specific technical matters. Similar advisory mechanisms are in use by other government agencies, including the Departments of Defense, Transportation, Commerce, NASA, etc., and have proven their worth. The Committee recommends the early establishment of the Advisory Board by the Secretary. At the same time, the Committee cautions that the degree of effectiveness of this or any other advisory body will depend on the legal constraints on the membership.

Finally, the Committee wishes to emphasize the importance of arriving at a relatively stable national energy plan in order to make it possible for DOE to conduct a responsive energy RD&D program. By their very nature, most emerging energy options require many years for the transition from the research to the utilization stage, and without reasonable program stability the private sector is hesitant to join with DOE in the commitment of the necessary and substantial resources.

CHAPTER I

INTRODUCTION

Securing the energy future of the United States requires a cooperative partnership between the federal government and the private sector energy industry.[1]

The keynote to this theme was stated by President Carter in his Report to the Congress in January 1977 on The Organization of the Federal Energy Functions (frontispiece). Secretary Schlesinger in his testimony before the Committee on Science and Technology of the House of Representatives on January 25, 1978, as he presented the Department of Energy's fiscal year 1979 energy program, stated:

> "In developing new technologies, the traditional concept of RD&D is not sufficient. The purpose of the energy research and development now must be aimed squarely at commercializing technologies at the earliest possible point. We must establish a set of priorities and likely energy supply pay-offs from each technology that is being pursued and move those technologies from the laboratory to the market place at the earliest point which is prudent."

The Department of Energy (DOE), formally established on October 1, 1977, brought together into one cabinet-level department the bulk of the energy-related programs and offices of the federal government. DOE absorbed the ERDA program in a reorganized form, along with its continuing need for cooperation with the private sector.

---

[1] The term "private sector," as used in this report, includes the total group of energy-related organizations, that are not associated with the federal government, plus all federally-related energy delivery organizations, such as the TVA, REA, etc. As used by the Committee, "industry," "academia," and "non-profit organizations" are sub-units of the private sector.

Despite earnest efforts by ERDA, and now assumed by DOE, the establishment of a sound and constructive relationship with the private sector has proven to be a difficult and elusive task. It is too early to judge whether DOE's policies and organizational structure will result in a more effective approach to the problem, but as noted later in this report, there is every reason to believe that significant difficulties and problems will persist unless important new initiatives are undertaken.

In the research and development area, despite a continuous dialogue between ERDA staff members and industry representatives, there is a general feeling in both government and industry that the ERDA technology development program failed to reflect the best advice and guidance available from the private sector and that the transfer of technology requirements between government research and private manufacturing and production is poor. Demonstration projects pose the greatest challenge, both because of their importance and because of the substantial investments involved, and here the historical record is unimpressive. As will be discussed later, the problems/difficulties commonly stem from federal laws and policies that were beyond ERDA control, but that nevertheless have basic implications for the nature and quality of the government-private sector interaction that can be achieved.

The present study was started early in 1977 in response to a need expressed by the then Assistant Administrator for ERDA Planning, Analysis, and Evaluation and was endorsed by the Administrator of ERDA. The primary purpose was to explore various institutional alternatives that might be employed by the federal government and the private sector to provide an effective coupling between the requirements of the private sector for new energy technologies and the governments planning process to develop these technologies. This also included an analysis of several institutional initiatives that have been tested by ERDA to create an effective working relationship with industry. Based on these studies, the Committee was requested to make recommendations on an appropriate institutional mechanism to improve the planning process.

Two factors led to some indecisiveness in the Committee's early deliberations. First, it was recognized from the start that a meaningful study of appropriate planning mechanisms could not be undertaken except in the context of a broader analysis of how ERDA and the private sector can, and should, interact. It is clear, for example, that a major planning theme should be the question of how government-supported technology can be transferred to the private sector at the earliest possible opportunity. Accordingly, the Committee decided to include this larger issue as part of its charge, while concentrating on issues that specifically relate to the RD&D planning process.

More important was the recognition that initiatives by the new Carter administration would result in substantial changes in the ERDA organization, and of course, this did occur with the formation of the new DOE. The Committee was concerned whether the findings of the study, based on the ERDA experience and organizational structure, would also be relevant to the new organization whose features were as yet undefined. As the studies continued, it became clear that the key elements of the Committee's thinking were broadly applicable and largely independent of specific organizational approaches. Toward the end of the Committee's work, the structure of DOE became known, and it was possible for the Committee to use this information to orient its conclusions regarding a suitable planning mechanism.

In conducting its studies, the Committee used a variety of data sources. The backgrounds of the Committee members reflected various types of experience, including senior technical positions with energy and other industrial companies, executive positions in various government agencies, lawyers versed in government affairs and energy matters, and non-profit foundations and professional societies. Every member of the Committee has had a long career working close to the interface between the federal government and the private sector.

The Committee had extensive discussions with ERDA management, requested written material from various industrial sources with experience in the energy field, and also commissioned a series of "background papers" from independent consultants. Issues chosen for in-depth study by the consultants included some with important policy implications for the questions under consideration, and examination of the government-industry interfaces in representative segments of the energy industry.

The background papers are useful resource documents in their respective subject areas and are worthy of more detailed examination by those interested in pursuing the study in greater depth. While the views and opinions expressed in these background papers are those of their authors, they were used in the deliberations of the Committee in arriving at its own conclusions and recommendations. Accordingly, they are included in a separate compilation of background papers identified as a Background Information Volume to this study available in the National Research Council archives.

CHAPTER II

THE GOVERNMENT ROLE IN ENERGY RD&D

The criteria used by ERDA to decide on new projects were outlined to the New York Society of Security Analysts in a paper presented by C. B. Smith, Special Assistant for Application Planning, on January 12, 1977. In the presentation it was pointed out that when a new technical option for energy production or conservation surfaces, the first question to be answered is whether the private sector is capable of exploiting the option by doing the research, development, and demonstration in a timely fashion without government participation. If the answer is "yes," which presumes that the option is marketable in the near future on a profitable basis, the government should not enter the picture unless the private effort falters. If the answer is that the private sector is not ready to exploit the option, the next consideration is whether the public interest, including such issues as economic stability, national security, and international energy strategy will benefit from timely exploitation of the option and therefore justify the contribution of federal support needed to bring it to a marketable stage. A positive answer justifies consideration of the project for government support.

Emphasizing that the role and nature of federal support for a new option must be flexible and decided on a case-by-case basis, the ERDA presentation detailed the variety of criteria used by the agency to determine the form and extent of federal participation. Throughout, the philosophy was for the agency to turn the reins over to private industry as quickly as possible. It was emphasized that ERDA is not authorized to subsidize widespread use. It was made clear, however, that ERDA can aid in the development through the stage of initial commercial introduction, if necessary, but not in widespread diffusion of the new option into the market.

A fundamental requirement for RD&D planning is the existence of a national energy plan that is understood and generally accepted by the public, by Congress, and by the private sector. Moreover, and particularly when a technical energy option must be pursued from research to the demonstration stage, the plan must have a reasonable assurance of stability over at least seven to ten years. Recognizing that flexibility must be maintained in order to accommodate new information and technological options that may appear in the future, an essential element for successful collaboration between government and industry is mutual confidence that agreed-upon commitments of financial and technical resources will be honored. Erratic program starts and cancellations, particularly without in-depth consultation with industry, make it extremely difficult for a senior industrial executive to recommend that his company "go with the government." The Committee considers the question of program stability to be of the utmost importance in achieving a successful DOE/private sector interface. Chapter VI of this report discusses this issue in greater depth.

Effective collaboration between DOE and the private sector requires effective communication between the two. Final decisions regarding the content of DOE programs must be made by the DOE staff members that bear the responsibility for the disposition of public funds and resources. However, a free exchange of ideas and the ability to call on leaders from industry, universities, and other non-governmental organizations for suggestions, advice, and constructive criticism is obviously highly desirable. Input from industrial sources may include proprietary data and findings that are disclosed only on the basis that they will remain confidential between the parties involved. When it is to the advantage of DOE to receive such information, the system must insure scrupulous adherence to confidentiality agreements.

Whenever industrial representatives interact with government personnel on matters of their own concern, the possibility exists of conflict of interests between their concerns for their own company and the concerns of the government. A considerable body of legal and regulatory conflict-of-interest guidelines exist to guide such intentions. Progress in meeting our energy needs will be frustrated, however, if the restrictions are so severe that they preclude effective communication even when it is vital to the overall national objectives. As will be evident in the discussion, the Committee is convinced that we have reached this point.

To examine this question in depth, the Committee commissioned a study paper on the laws that regulate communication between DOE and the private sector. Chapter V contains an analysis which indicates that there is reason for serious concern in this area. Because of the importance of this subject, the commissioned study paper is included as an appendix to this report.

If DOE is to accomplish its desired goals, it is clear that there must be an effective participatory RD&D planning mechanism, and also that sound working arrangements must be established for the management of joint projects with industry. During the research and advanced development phases of a new energy option, cooperation between DOE and industry will often be mutually advantageous, since market concerns and proprietary considerations may still be far in the future. As the engineering and demonstration phases come into the fore, however, greater complexities arise in achieving a satisfactory partnership.

In most instances, it is the industry and not the government staffs who have the market-oriented experience and know-how to translate a successful development option into a commercially viable prototype. Certain demonstration projects may draw on proprietary data and skills in order to optimize their chances for success. At the same time, patent rights are sometimes a problem between the government and its industrial counterpart.

While ERDA, during its brief life span, stressed its desire to be flexible and equitable in joint ventures with industry, the Committee finds that in many instances the record falls short of these good intentions. Various contributing factors are discussed in later sections of the report, and it will be noted that the origin of some of the difficulties is beyond direct agency control.

The Committee did not conduct a study of government-industry contracting in the energy area, since its major attention was focussed on RD&D planning mechanisms. Nevertheless, the issue arose frequently during discussions with industry representatives. Considerable information was available to the Committee in the findings of the study papers and from the experience of Committee members. Although the Committee did not have time to study the government side of the contracting interface, the Committee did consider this problem sufficiently significant to warrant drawing attention to it.

In addition to the need for maintaining effective communication between the DOE staff and industry representatives, another requirement for effective DOE planning is a formalized mechanism for injecting a balanced private sector viewpoint into the decision-making process by which DOE determines its future RD&D program. A formalized advisory mechanism, drawing on external expertise to help guide program planning, is a technique that has been widely and successfully used both within and outside of government.

One of the background papers commissioned by the Committee consists of a review of various advisory mechanisms used by government agencies to good advantage. In Chapter VII, the Committee analyzes this background experience and recommends an Energy RD&D Advisory Board which the Committee believes can best serve DOE needs.

CHAPTER III

THE ERDA (DOE)/PRIVATE SECTOR RD&D PLANNING INTERFACE

The change from the organizational structure used by ERDA to that used by DOE requires a different approach to maintaining effective communications with the private sector. In ERDA, the management of each major technology development was assigned to an Assistant Administrator with complete responsibility for the research, development, and demonstration projects in that technology. The DOE organization, on the other hand, places complete responsibility for the research phase of all technologies under a single Director of Energy Research, the development of all technologies under the Assistant Secretary for Energy Technology, and the commercialization of all technologies, with the exception of Conservation and Solar Technologies, under the Assistant Secretary for Resource Applications. An Assistant Secretary for Conservation and Solar Applications has responsibility for the commercialization of these two technologies.

As an example of the effect of this change in organization, it was relatively easy in the ERDA organization for a company interested in fossil fuel technology to communicate with the responsible office within the government. In the new DOE organization, three different organizational offices may have to be contacted to cover the complete fossil fuel technology RD&D cycle. The lowest organizational point at which a total perspective on fossil fuels can probably be found is at the level of the Under Secretary of DOE. Since the technology development process does not naturally lend itself to neat compartmentalization into research, development, and demonstration phases, it may be more difficult to communicate effectively across the DOE government/private sector interface.

One of the principal drawbacks of the ERDA organizational structure was the problem of making priority judgments among different technologies. Since the individual technology development programs were organizationally separate, the priority judgments usually were not made until the requirement for project funding was significant enough to come to the attention of the responsible Assistant Administrator. At this stage, sizable funds usually had already been expended and heavy organizational commitments made. This greatly complicated the problem of making objective choices between promising and less promising projects in different technologies. This delay in making the hard choices has the obvious drawback of wasting resources on less promising projects long after they should have been dropped. In the new DOE organization, on the other hand, the opportunity for making priority choices is built into the organizational structure at all stages of the development cycle, starting with the research phase and extending through the development and into the demonstration phase. Funding constraints imposed on each of the Assistant Secretaries with responsibility for a particular development stage will force the program managers to weed out the less promising ideas or technologies early in order to find support for the good ideas.

The Committee cautions DOE that this change in organization may not improve the effectiveness of the total U.S. energy technology development effort. The ERDA organization provided for a simple communication interface in each technology area but found it difficult to make priority choices. The DOE simplifies the priority choices, but potentially complicates the communication interface with the private sector. Management must be sensitive to and compensate for the inherent weakness of whichever organizational structure exists.

The ultimate objective of private sector participation in government planning is to provide for more effective diffusion of government-supported technology developments in the competitive energy industry. To achieve this objective, two criteria must be satisfied: 1) the horizon of the RD&D planning process must include commercialization and 2) there must be suitable mechanisms to provide for the transition of a government-supported technology development into commercial use. While effective participatory planning is a significant first step, the success of the enterprise depends heavily on the effectiveness of the technology transition mechanism. The Committee did not study this problem. The reader is referred to an ERDA (DOE) study by a Demonstration Study Task Force under the Chairmanship of Dr. Robert Charpie, which specifically addressed this issue.[1]

---

[1] "The Demonstration Project as a Procedure for Accelerating the Application of New Technology" by the Charpie Task Force, Feb 1978 (DOE/RA-003/1).

A basic premise in planning the government-supported RD&D program is that the private sector has the paramount role in the development and commercialization of new energy technologies, and that the federal government is responsible for planning, initiating, stimulating, and encouraging the development and demonstration of those new technologies that industry will not support on its own. Planning such complementary federal RD&D energy programs without leaving important gaps and at the same time avoiding unnecessary duplication requires both an awareness of the technologies required by the future energy market and information on private sector in-house RD&D activities. However, much of their information is held as proprietary information by individual companies.

The required planning information varies in nature, depending on the stage in the development cycle. In the early research or invention stage, where promising technological options are considered for initial exploration, market sensitivity is minimal. As the more promising technological options advance through the development phase and approach demonstration for eventual diffusion in the industry, an increasing amount of information on the competitive aspects of the market is required. The successful diffusion of a new technology in the market depends on strong "market-pull" forces for the particular technology. These forces are the summation of many subtle and some obvious factors comprising the competitive market. These factors usually cannot be neatly tabulated, evaluated, and then translated into a successful market decision. In most cases, the assessment is highly subjective, and is sometimes contrary to the available objective evidence. Corporate managers routinely make judgments based on their perception of and sensitivity to these factors.

To familiarize itself with the actions taken by ERDA to develop the type of planning information required, the Committee was briefed by the Assistant Administrators (AA) responsible for individual technologies, or their representatives, and the Assistant Administrator (AA) for Planning, Analysis, and Evaluation on their perceptions of the ERDA/industry interface. Generally, the technology AA's felt that they had very little difficulty maintaining contact with the industry in their technology sector. However, they implied that much of this interaction involved project selling by industry representatives rather than sharing of technical information. In several cases, they seemed to be primarily concerned with getting additional competent staff members who could bring industry experience into the management of their programs.

Very little concern was expressed by the technology AA's on their need for information on the industry's in-house research and development programs, which is usually kept as proprietary information by individual companies. This apparent lack of concern surprised the Committee, since details of the in-house program are important in planning a complementary government RD&D program. While the Committee was not in a position to analyze this apparent lack of interest, the members of the Committee contended intuitively and perhaps erroneously that either the ERDA RD&D planners wanted to avoid areas of presumed special industry interest and to plan their programs accordingly, or that the industry's in-house RD&D was simply disregarded in formulating the federal program. However that may be, the Committee is convinced that industry in-house RD&D activity must be considered in planning the federal program in order to prevent unnecessary duplication and to avoid important program gaps. Furthermore, if the federal program duplicates the industry's in-house program in some important areas, this can seriously affect industry's opportunity to establish a proprietary position, which is one of the primary motivational factors in industry's support of research.

The AA for Planning, Analysis, and Evaluation, who was responsible for ensuring that the balance between different ERDA technology development programs was consistent with the priorities of the National Energy Plan, felt seriously handicapped by the lack of adequate information on the technology required to satisfy the future energy market. Unlike the other AA's he was also seriously concerned about the lack of reliable information on the industry's in-house technology RD&D program, needed to evaluate the adequacy of the complementary federal RD&D program.

The Committee reviewed ERDA's efforts to improve the planning information base and to obtain the necessary industry and academic expertise to assist in the planning process. These efforts included the use of advisory committees inherited from its predecessor agencies; the use of modeling techniques to determine the future behavior of the energy market, as a basis for estimates of future technology requirements; the development of survey techniques that can gather essential information on the industry's in-house RD&D program; and actions to enhance the level of industrial management expertise available to the ERDA headquarters staff. These are discussed in the following paragraphs.

Energy Advisory Committees

When ERDA was established in 1975, the new agency inherited a number of advisory committees that were associated with the technology programs moved into ERDA from other federal agencies. Some of these committees were terminated while others were continued with re-oriented charters. When ERDA was absorbed by DOE on October 1, 1977, it had four functioning advisory committees involved directly with energy technology. These included:

1.) General Advisory Committee, which advised the Administrator on broad issues cutting across specific program areas,

2.) Fossil Energy Advisory Committee (previously called General Technical Advisory Committee), which advised the AA for Fossil Energy on the Fossil Fuel Technology Program,

3.) Lignite Advisory Committee, which advised the AA for Fossil Energy on the functions of one specific energy research center at Grand Forks, North Dakota, which conducts ERDA's Lignite Coal Utilization Research Program, and

4.) Geothermal Energy Advisory Committee, which advised the AA for Solar, Geothermal, and Advanced Energy Systems on geothermal energy.

When the new DOE assumed responsibility for the federal energy program, the ERDA Committee structure was reviewed. As a result of this review the General Advisory Committee was abolished and the Lignite Advisory Committee was made into a subcommittee of the Fossil Energy Advisory Committee. The Geothermal Advisory Committee, organized by ERDA, was retained to function in its technology area. DOE is currently reviewing the complete advisory requirements of the Department and expects to design a suitable structure that can serve the broader requirements of the new agency. The recommendations in this report are expected to be considered in devising a suitable mechanism. The carry-over committees from ERDA will probably be folded into the new advisory structure.

Determination of Future Technology Requirements

ERDA conducted a Market Oriented Program Planning Study (MOPPS) to determine the energy technology required in the year 2000. This study used a model of the energy demand in three consumer areas to project future market energy requirements. The consumer areas covered the residential and commercial sectors, the industrial sector, and the transportation sector. Two different growth scenarios were used, one with a low, 2.3%, and the other with a high, 3.6%, GNP growth rate. Initial assumptions were made to cover such issues as oil and gas price regulation, market pricing mechanisms, OPEC behavior, economic and political stability, the federal role in the energy partnership, and the anticipated population growth rate. Historical energy production and consumption data covering the years since 1975 were used in the model as a basis for the projection.

The Committee did not have an opportunity to study this project in sufficient detail to judge its quality. Several comments are in order, however. A data base with a two-year time depth, although it may be comprehensive, is extremely weak to support a 25-year projection into the future. This is particularly true if one considers the turbulent nature of the energy market during this brief period. The Committee is also uneasy about the fidelity of any model to simulate the future market behavior. The randomness and non-linearity of many of the forces that affect market behavior defy modeling in the conventional sense. The Committee is also concerned that an adequate sensitivity analysis of the model be made to determine its response to changes both in the initial assumptions and the market survey data.

However, the Committee recommends the continuation of efforts to understand what the future market demands will be. DOE should also be encouraged to relate its efforts to the market behavior studies conducted by the Department of Commerce and major energy corporations, in order to have access to their data and to refine its own understanding of future energy technology requirements.

Survey of Industrial In-House RD&D Activity

ERDA contracted with the Industrial Research Institute Research Corporation (IRIRC) for a study of the feasibility of conducting a survey of the energy industry companies to determine their in-house RD&D activity. The objective of the survey was to determine the willingness of companies to provide reliable and comprehensive data on their in-house energy RD&D. In order to protect the proprietary nature of these data, it was agreed from the beginning that before the survey results were turned over to ERDA or made public, the survey contractor would aggregate the data from all companies within an industrial sector into a single data set, with all company identification removed. The industry response to the survey was uniformly favorable. In all cases companies wanted absolute assurance that the confidentiality of their original data would be maintained. They also suggested that the research categories in the survey form be standardized in order to both simplify the data collection and improve the accuracy of the data aggregation process.

As in the case of market-oriented studies, the Committee agrees that effort in this area should be continued. The Committee is somewhat skeptical, however, that the aggregated sanitized data will really satisfy this part of the planning information requirements. However, it should be an improvement over the current situation, where no or very limited proprietary information is available. The Committee suggests that experimentation be continued to develop the required information on industry's in-house RD&D activities.

Enhancement of Management Expertise

In the discussion with ERDA officials there was general recognition that the federal RD&D planning process and the program management could be made more responsive to the technology requirements of the energy industry by the infusion of industry experience into the program management staff.

The AA for Fossil Energy persuaded the American Society of Mechanical Engineers to organize a consortium of professional engineering societies, identified as the Engineering Societies Commission on Energy (ESCOE), to provide independent objective consultation and advice on the planning and management of the fossil energy RD&D program. As it is set up, ESCOE operates an Engineering Residency Program in Washington, D.C. under contract to ERDA (DOE). The participating societies assist in recruiting a staff of ten to twelve highly qualified people with diverse backgrounds, half from industry and half from academia, to serve for periods of up to two years as employees of ESCOE. While the primary objective of ESCOE under ERDA was focussed on fossil energy technology, the scope of ESCOE's responsibilities is to be expanded under DOE to include other energy technologies. The success of this program depends on the willingness of companies and universities to recommend and release experienced staff members of the caliber required, for a period of up to two years.

Another effort to bring industry expertise into the ERDA program management was the initiation of a Pilot Product Planning Team, patterned after a concept commonly used in industry to bring a new product into profitable commercial production. On a pilot basis, ERDA assembled a team of individuals either retired or on loan from industry, who were experienced in managing new ventures, to work closely with the ERDA program management in the development of a thermally activated heat pump. While this is a common industry practice, it seems somewhat out-of-place in the ERDA (or DOE) framework where the market rewards or penalties are not the motivating forces. The early market-oriented thinking by federal program managers, however, should upgrade the usefulness of the technology development products. Even though such a Product Planning Team may ask some of the right questions as a new product proceeds through the development process, the Committee does not consider this concept to be an adequate substitute for participatory planning.

The Committee recognized ERDA's concern to improve both the level of industry-related expertise and the quality of information of market behavior available to the federal energy RD&D program managers. The Committee agrees that these are important objectives, but is convinced that even if these initiatives are completely successful, they cannot be considered substitutes for an effective participatory planning mechanism required by the energy partnership. In all of these initiatives, the critical feedback loop from the technology user or operator bringing the economic realities of the competitive market place to the technology development planner is missing. This feedback signal provides the basis for effective debate between the technology developer and the users, thereby testing the responsiveness of the technology development program to the future requirements of the market. While the Committee's attention was directed at ERDA, these considerations have broad applicability and are also relevant to the DOE energy RD&D planning process.

CHAPTER IV

INDUSTRY PERCEPTIONS OF THE ERDA/PRIVATE SECTOR INTERFACE

As part of its studies, the Committee considered it important to gain an understanding of reasonably representative current industry attitudes toward involvement of the federal government in energy RD&D. It was appreciated at the start that the diversity and size of the energy industry meant that only a sampling of viewpoints could be obtained. Moreover, even within a single segment of the industry, a wide variation in perceptions from one private company to the next was expected. It was decided, therefore, to concentrate on three energy technology areas characterized by important RD&D requirements, each chosen because it reflected a unique set of problems involved in the interface between ERDA and the private sector.

The technology areas chosen for in-depth study include the syn-fuel industry, the nuclear power industry, and the solar energy industry. Syn-fuels[1] is an area where substantial RD&D history has been accumulated within the private sector in the United States and abroad, and where further progress, to a great extent, requires large demonstration projects. The experience of the nuclear industry differs from the syn-fuels experience because of the heavy Federal involvement in nuclear research and development, as well as the extensive experience gained through the Naval Reactor Program. Finally, solar energy was chosen for study because it is an emerging energy option and, unlike the case of the syn-fuels and nuclear industries, the solar energy industry includes a large number of relatively small companies.

It was originally intended that in-depth background study papers would be commissioned for each of the three areas, but it was not possible to locate an acceptable source for the syn-fuels study within the time constraints established by the Committee. Therefore, in the syn-fuel area, information was collected by sending questionnaires to a representative group of companies engaged in syn-fuel projects and by interviews with private sector representatives. A tabulation of the questionnaire responses and the full texts of the background papers covering for the nuclear and solar areas are included in the Background Information Volume of this study available in the National Research Council archives.

---

[1] The term Syn-fuels as used in this study refers to those gaseous and liquid fuels upgraded by conversion from solids such as coal, shale, tar sands, etc.

The following is a summary discussion of the pertinent views expressed by the industry responses in the three technology areas.

SYN-FUELS

The syn-fuels area poses certain unique problems for DOE/industry cooperation, largely because most of the know-how relating to syn-fuels technology is in private hands and has reached an advanced stage of development. While it would be rash to state that new technological breakthroughs will not occur in the future, industry responses emphasized that present knowledge is sufficient to warrant undertaking large and costly demonstration projects as the next step in the development of the technology.

According to industry, syn-fuels technology becomes a federal RD&D concern because of the very large financial commitment needed for demonstration plants, and because the most optimistic forecasts indicate that, while syn-fuel development may be essential to national security, syn-fuels will not be competitive with products refined from petroleum and natural gas for a decade or more, in light of OPEC pricing flexibility, which is essentially independent of the cost of production, and the extent of government regulation of prices. From the viewpoint of planning the national energy future, it is of the utmost importance that operating experience and accurate cost data for syn-fuels plants be obtained as quickly as possible. Industry is unwilling or unable except in a few cases involving larger corporations in demonstrating company-originated processes, to commit major resources without reasonable assurance of a timely and adequate return on investment. The federal role as catalyst and financial backer becomes essential to early progress.

The history of government/industry collaboration on syn-fuels projects has been a less than happy one. Technical issues have raised some problems, but the major controversies arose over project management policies, environmental restrictions, cost-sharing formulas, pricing, and even federal land-leasing policies. In spite of this, there is general agreement among industry representatives that it is important for demonstration projects to proceed promptly, and that industry will cooperate fully within its economic means in the planning and implementation of such projects, provided that private sector participation is encouraged and that formulas can be devised to protect proprietary interests.

NUCLEAR POWER

Industry representatives acknowledge the leadership role of the government in nuclear research and development, but feel strongly that the management of demonstration plants aimed at the commercial energy market should be in the hands of private utilities. They contented that when a government staff assumes this responsibility, costs are not constrained by commercial standards because of a tendency to force the development to satisfy naval reactor performance criteria and thereby prolonging the development phase. This is further aggravated by the insistence on levels of quality control and equipment reliability which may not improve plant safety but result in substantial cost increases.

As an example, industry proponents point to the Clinch River Breeder Reactor project. Even though the reason for termination was the President's stand on nuclear weapons proliferation, the project was already in considerable trouble because of major cost overruns and technical differences between the government and participating industry staffs. Begun as a cooperatively managed project, essentially complete control was taken by the government in the later stages, as its share of the projected costs kept escalating. According to the expressed view, the program direction increasingly veered from the proper objectives of a demonstration project for eventual commercialization towards the objective simply of development, as the degree of ERDA management control increased. Moreover, progress was slow and with continuing cost escalation, invited efforts for termination by its critics.

While the issues are complex, the attitude of the nuclear industry can be summarized by its desire for a stronger voice both in DOE program planning as well as in program implementation. It would be unfair to say that ERDA failed to recognize the validity of this point of view (the Clinch River program was originally under the direction of a joint management operation, with the government directing the R&D and the nuclear reactor, and the utilities [753 electric companies], in the form of a Project Management Corporation, directing the power-generating portion of the project. These were later integrated, with the government assuming a dominant role when its share of the costs kept escalating). Experience to date indicates that, where the possibility of commercialization is the end objective, a strengthening and formalization of the private sector role is needed for the future.

SOLAR POWER

Practical uses of solar power technology are at present limited to hot water and space heating applications, with a large number of companies (mostly of small size) engaged in the production and installation of flat plate solar collector systems. More advanced uses of solar energy, such as space cooling, thermal electric power generation, photovoltaic power generation, wind power, and ocean thermal energy conversion, are still largely confined to RD&D activities supported primarily by DOE. Research and development participants include both large and some small companies, a few with sophisticated technical resources.

Except under uniquely favorable circumstances, even the simpler applications of solar energy, such as hot water and space heating, are at best marginally competitive on the basis of current equipment costs and market energy prices. Because of the federal government's strong desire to stimulate greater use of solar energy as a secondary energy source, leading to increased production volume and reduced costs, a host of demonstration projects has been initiated to gather long-term operating data to provide the basis for advancing technical objectives and lowering cost. There is little doubt that the appeal of an inexhaustible source of energy from the sun has a powerful fascination in the public mind, but it remains to be seen whether the efforts toward demonstration will yield sufficient new data and insights to bring these objectives within reach.

Members of the solar energy industry have ambivalent views about the proper role for the federal government in helping to advance the field. Manufacturers of flat plate solar collectors believe that the government should not engage in technical development activities, lest the opportunity by the private sector to establish proprietary rights be undermined. On the other hand, companies would like to see the government, or a suitable trade association, lead the way in developing reasonable standards for performance that will prevent the sale of shoddy products and avoid public disenchantment. There is the parallel concern, however, that overly stringent standards may be promulgated, which would raise the costs of compliance and thereby slow the diffusion of solar energy technology into the commercial market.

In the more advanced areas of solar research and technology, there is general agreement that DOE has a legitimate role in providing some of the resources essential for timely progress. As in the other energy areas, members of the solar energy industry join in the viewpoint that the government role should be supportive, and that new technology should be transferred to the private sector as quickly as possible.

Despite the differences among the three energy industries, the studies in each area reflect considerable unanimity on the role that industry believes the government should fill in energy RD&D. Specifically, the government should concentrate its RD&D activities on promising energy options that the private sector is unable to support on its own. As the development of such a new energy option reaches the demonstration phase, private sector feels that federal support should be phased out and that industry should take over. There is a clear recognition by the industry that the government has a legitimate role in assuring that critical technologies are available for use by the industry when needed.

It is generally accepted, however, that certain new energy options will not come onstream within the time frame required for national security and other reasons unless government support is added to the private sector effort. In the area of fundamental research, for example, the government has accepted the role of being a major supporter of the national effort across the spectrum of science and engineering; increased government effort in the different energy areas fits into this conception of the government's role.

Developmental projects should be undertaken by the government only when private industry is not mounting an adequate effort. A similar criterion should also apply to the case of major demonstration projects, which in every instance involving the government should be carried out as a cooperative effort with industry. In some cases, because of national interests, commercial-sized demonstration projects may have to be started even though they may not be able to compete in the market with the price flexibility advantage of imported oil.

In short, there is broad agreement within the industry that federal RD&D program planning should complement and be supportive of the private effort and should not promote government initiatives that cannot be effectively meshed with private industry plans. The government effort should concentrate on longer-term goals, with private industry pursuing the near-term energy options within the normal competitive constraints of the marketplace.

Most industrial executives question how federal RD&D planning can proceed rationally in the absence of a generally accepted and reasonably stable national energy policy. Since DOE should not duplicate the near-term technological objectives of the private sector, its planning should be aimed primarily at longer-range goals, e.g., helping to insure that new energy options, which are not yet commercially attractive, reach that state within a time period that fits the national needs. Since government energy planning thus far has been characterized by numerous changes in policy, which in turn have resulted in shifts and discontinuities in program directions, many industrial executives are wary of committing private resources to an uncertain future.

There is also a prevailing opinion that government planning has been accomplished without the benefit of adequate input from the private sector. Since industry will eventually bear the burden of translating the products of government RD&D into commercial practice, most private sector representatives feel that some organizational mechanism should insure that industrial viewpoints and ideas have an opportunity to be considered carefully for incorporation into federal RD&D planning.

Industry responses recognized that technology diffusion in the market is often a difficult and unpredictable process. Survival of industry in-house technology developments in the competitive market is also fraught with uncertainty. To enhance the survival rate, regardless of who supports the development, the most knowledgeable judgment should be used in planning the program.

Other areas of concern related to government/private sector interaction are the protection of proprietary information when a company reveals such data to DOE, the protection of patent rights, and the potential exposure of individuals and companies to antitrust and conflict-of-interest accusations based on planning activities undertaken in collaboration with DOE. It has already been noted that these kinds of legal barriers were brought to the Committee's attention early in its studies, and that because of their importance they are explored in detail in a later section of the report.

CHAPTER V

LEGAL CONSTRAINTS TO DOE/PRIVATE SECTOR COOPERATION

It has already been emphasized that a primary requirement for effective DOE/private sector interaction is maintaining open and free lines of communication between the two. Ideally, industry representatives should be willing and anxious to communicate their knowledge and ideas to DOE staff members as a constructive contribution toward optimizing the effectiveness of DOE planning and program implementation, eliminating unnecessary duplication of effort, and insuring the viability of our national energy posture. From the DOE viewpoint, close collaboration with industry is important to insure that technology transfer from DOE to the private sector is accomplished expeditiously, and to serve as a channel through which DOE staff members are kept aware of the commercial feasibility and marketability of new energy options.

As the Committee continued its studies, it became clear that there are a number of legal constraints that tend to reduce the ease with which information flows between government and the private sector. In order to gain a deeper understanding of these issues, a background study paper was requested of The Research Group Inc., Charlottesville, Va., which made available a team of expert legal analysts. The complete text of this background paper is included in the Appendix to this report.

At the outset, it must be appreciated that the problem of communication is exacerbated by the fact that the motivations and interests of individual private companies will never be identical to those of DOE. The very essence of the free enterprise system is that a company be successful in the market and earn a satisfactory return on its investment. Hence, complete disclosure of proprietary data and know-how prior to commercial exploitation is often inimical to its own best interests. Even in closely regulated industries, such as the private electric utility industry, there is the continual appearance of conflict between private and public interests: between the responsibility of company management to generate earnings for its shareholders and meet future capital requirements, and the pressures on regulatory agencies to keep utility rates as low as possible.

It is precisely to deal with potential conflicts of interest, real or imaginary, that the body of laws and regulations described in this section came into being. While each law or regulation taken on its own can be justified on the basis of past experiences, taken as a whole they represent a significant deterrent to free communication between DOE and the private sector.

In the discussion which follows, the principal legal barriers to communication are highlighted, along with the laws and regulations from which they were derived. Greater detail is contained in the Appendix.

The Conflict with the Government's Effort at Openness

The Freedom of Information Act (FOIA; 5 U.S. COde Section 552), the Government in the Sunshine Act (Sunshine Act; PL 94-409), and the Federal Advisory Committee Act (FACA; 5 U.S. COde Appendix 1, Section 1) are all directed toward the desirable ends of increased public awareness and access to the process by which government decisions are made, and the avoidance of conflict-of-interest on the part of government advisers who contribute to the decision-making process. In working toward these goals, an undesirable side effect is that barriers are raised to the ability of DOE to take advantage of the innovative capabilities, managerial talent, and experience of the private sector.

FOIA was enacted to provide formal notice, by publication, of government actions to persons affected by federal agency activities, and to make agency documents available for inspection by an interested public. The Act does contain statutory exceptions that justify an agency's refusing to disclose information that falls within one of nine exempt categories, including "trade secrets and commercial or financial information obtained from a person and privileged or confidential."

As pointed out in detail in The Research Group, Inc., paper however, a private company wishing to aid DOE by divulging proprietary data or privileged information has good reason to doubt whether DOE can preserve its confidential status. To begin with, the courts have interpreted the nine exemption provisions quite narrowly. Moreover, nothing in the Act prevents any agency from voluntarily disclosing the confidential information it acquires, although recent court decisions in "reverse-FOIA" suits have ruled against agency disclosure of certain exempt information. Whether the rulings have, in fact, prevented disclosure of exempt information in other contexts is unknown.

The Committee was not made aware of anything in ERDA's history indicating that it has knowingly engaged in unethical or unprofessional conduct. Nevertheless, there is a lack of clear and decisive legal framework for protecting proprietary information. Litigation may, of course, result in the eventual disclosure of the information. Moreover, the fact that litigation might be necessary to protect valued data tends to inhibit private sector participation in the DOE planning process.

While FOIA gives the public access to printed material, the open-meetings provision of the Sunshine Act gives the public the right to sit in on the oral deliberations of an agency. As in the case of FOIA, exemptions are provided, but the procedures for closing a meeting to the public are made intentionally burdensome, and the exemptions must conform strictly to court decisions interpreting the law. It hardly needs mentioning that participants in open meetings will probably be careful to exclude from their remarks the kind of input most desired, i.e., private insights and privileged information gained from experience. Finally, the FACA mandates that the meetings of advisory committees be open. While exceptions to this mandate can be invoked by the agency, the process has also been made purposely difficult to discourage such action. FACA has such broad application that it will tend to keep substantive and controversial issues off the advisory agenda. This will have the obvious impact of discouraging many experts from joining DOE planning and review groups. Open meetings will therefore tend to be empty meetings.

As an additional illustration of the kind of government initiatives that reduce the willingness of private sector representatives to contribute to DOE planning, consider S.555 of the 95th Congress, 1st Session, which was under Congressional consideration at the time of this writing. The intent of S.555 is to prevent senior government employees from directly benefitting from their government service by controlling the acceptance of employment within industry. A grace period of two years is specified after they leave the government, during which time they cannot accept private employment with any organization that deals with the government in the same area of activity that they were involved in. This prohibition would include all divisions of large industrial organizations with widely different product lines, as long as one division has dealings with the government. One interpretation of the bill, as presently drafted, is that even part-time consultants to the government would come under its provisions. This would be a major expansion of a current

Executive Order which prohibits employment in a production division with which the former employee had dealings as a government employee, for one year after leaving the government. This legislation may never be enacted, but its philosophical intent affects the climate for participation in RD&D planning by experts from the private sector.

Protection of Proprietary Information

It has already been noted that "openness" laws raise a number of issues relating to the protection of a private company's proprietary information and trade secrets when they are made available to DOE. The problem is made even more complex by legal issues other than those specifically relating to openness in government operations.

It is important to note that, in order to carry out its mission of preparing a national energy plan and protecting the energy future of the nation, DOE has been given statutory authority to acquire trade secrets and proprietary data and is under a general instruction to protect such information when it does acquire it. (A similar authority was granted the National Aeronautics and Space Administration in aerospace science and engineering, but the best information available to the Committee indicates that NASA has never exercised its rights in this regard.) Should DOE invoke this privilege, the question arises as to whether it can indeed honor its commitment to preserve the confidential nature of the material divulged to it.

In the private sector, a trade secret is lost when it is effectively disclosed to other parties. The same is not true, however, when a trade secret is disclosed to a federal agency. Instead, the rule is that the owner still possesses his trade secret under such a circumstance. However, there are so many qualifications to this rule that it provides little confidence to the private firm risking its valuable property by disclosing a trade secret to the government.

The owner of a trade secret who discloses it to a federal agency must continue to treat it as a secret. The typical method of doing so is by use of a restrictive marking on each page of a document containing the secret. The federal courts, however, have not recognized this type of marking as necessarily providing full protection. Indeed, one court has merely stated that there must be a hearing before such information is released (Federal District Court, District of Columbia, International Engineering Co. v. Richards 1973).

Once a trade secret is released by an agency, a private firm has no effective remedy to recover the loss it thereby suffers. A suit can conceivably be brought under the Federal Tort Claims Act, but the possibility of success in such an action is untested. Agency employees who wrongfully divulge information are subject to mild criminal sanctions, but legal research failed to reveal a single instance of such a sanction being invoked. The real threat, however, is that a DOE employee will leave the agency, go into the private energy industry, and take confidential information with him. Current law provides the original owner no remedy at all in this situation.

The Protection of Patent Rights

A patent is the legal right of an inventor to use or practice his invention for 17 years before others can use it. It is given by federal law to encourage the effort and imagination necessary for invention. The holder of a patent may grant a license to others to practice his invention, either on an exclusive or nonexclusive basis.

The policy of DOE with respect to patents for non-nuclear technologies is governed by Section 9 of the Federal Non-Nuclear Energy Research & Development Act of 1974 (PL 93-577) and by the proposed regulations promulgated in conformity with that Act. Patents covering nuclear technology are governed by the Atomic Energy Act, which vests title to them in the government. Basically, the policy of DOE is to acquire the rights to all patents for inventions arising out of direct RD&D contracts. However, there is an exception to this rule. DOE can waive its right to the patent in order to encourage investment of venture capital in energy RD&D. Still, the grounds for a waiver are based on broad policy objectives and provide no certainty to a private firm that DOE will waive its right to the patent, either at the time of contracting or when an invention is identified.

There are, in addition, other aspects of DOE's patent policy that create uncertainty and concern in private industry. When a waiver is requested but refused, or if a waiver is not sought by a party contracting with DOE, the inventor normally retains a nonexclusive paid-up license to practice the invention. However, the value of this paid-up license can be seriously degraded by DOE granting a license to another firm, which DOE can do if it feels that this action will lead to further practical application of the invention.

Another problem involves "background patents"--those which a contractor developed in an area of energy technology prior to its contract with DOE. Under certain situations, DOE has the right to license these patents in order to promote the rapid diffusion of information. Moreover, a DOE contracting officer has the right to review any data and records kept by a DOE contractor. All these patent provisions create serious concern in private industry that valuable business assets may be appropriated by DOE.

None of these patent problems apply directly to joint planning sessions. DOE's patent policy only applies to its RD&D contractors, and no participant in joint planning is likely to lose any patent rights in the course of that activity. However, the uncertainties in DOE's patent policy have created a generalized fear in private industry that jaundices its view toward any dealing with DOE. Private companies are in a competitive business which must generate earnings, and many aspects of the DOE patent policy are a threat to these earnings. One way to improve this difficult situation is to revise patent policies in such a way as to make them predictable and well-understood, but also to make them consistent with the preservation of essential and legitimate business interests of the private sector. Legislation may be necessary to accomplish these objectives.

Organizational Conflicts of Interest

No firm should be allowed to prepare specifications in such a manner that it gives itself an unfair advantage in later procurement contracting. When DOE contracts to obtain advice, that advice should be objective, trustworthy, and not slanted to promote the aspirations of the advising firm or individual. These two goals may prove difficult to achieve, however, when contracting firms are involved in "organizational conflicts of interest." The issue raised by such conflicts has been debated sporadically in Congress over the past 15 years and has resulted in a number of statutes and regulations--some affecting DOE--that create barriers to joint planning.

The existing regulations have two goals. The first is to avoid unfair competitive advantages. These occur when a private party has an opportunity to participate in the initial stages of a program, and thereby gains an advantage in winning the contracts that flow from the program. The second goal is to ensure that the government obtains the most competent, unbiased, and reliable advice. The objectivity of a private party, be it an industrialist or an academician, who is advising the government on the feasibility of a program may be tainted by the adviser's desire to participate in that program in the future.

The shortcomings of the existing regulations were revealed in detail in the "Bechtel Hearings" before the Subcommittee on Energy Research and Water Resources of the

Senate Interior Committee, conducted from November 17 to December 5, 1975. The hearings uncovered significant conflicts of interest, which were not revealed under the constraints of current law. As a result of the hearings, both new congressional legislation and a new ERDA regulation were adopted.

The new regulatory solution to this problem appeared as ERDA-PR Temporary Regulation 35, and the legislative solution as PL 95-39. Both efforts require that any firm proposing to do work for ERDA affirmatively identify to the agency any potential conflict of interest. Temporary Regulation 35 applies only to technical and management support services, but requires automatic disqualification of a firm with a conflict. It also prohibits participation in any future work which "stems directly" from the project. PL 95-39, on the other hand, applies to all DOE contracts, but allows DOE officials to contract even where a conflict exists, if it is in the best interest of the United States and if its effect can be mitigated.

From the industry point of view, the problem with both provisions is the undefined breadth of information required. Both require disclosure of all information relating to any possible conflict of interest. The limits of this disclosure are undefined, and indeed probably cannot be defined. One large functional problem is that the scope of many RD&D planning activities is uncertain at the time disclosure is required.

For the larger corporation, these problems are compounded. A large corporation with many operating divisions may have hundreds of contracts with various government agencies. Identifying conflicts of interest may therefore be literally impossible, and collecting the data required will certainly be expensive. This alone may keep some large corporations knowledgeable in the energy field from participating in joint planning. Moreover, the prohibition in Temporary Regulation 35 against acquiring a contract which "stems directly" from the original work will certainly deter any qualified firm from joint planning activities.

There are two competing policy factors here: obtaining the best advice and not providing advisers an unfair competitive advantage. Whatever the balance that is struck between these two factors in future regulations, the rules must be clear and stable in order to encourage the most knowledgeable firms in the field to agree to give DOE preliminary advice, to the extent their interests permit. In striking the balance, moreover, it should be recognized that what is gained by leaning toward one objective may be offset by failure to achieve the other.

The Impact of Antitrust Considerations

Another disincentive to the participation of private industry in the planning of DOE-sponsored RD&D programs is the threat of antitrust liability. Analysis of the existing laws themselves, however, does not fully explain industry fears in this area.

The Sherman Act has been the basic antitrust law. It prohibited "restraint of trade" and "monopolization." The Act was intended to be broad in scope but was initially interpreted rather narrowly by the courts. To remedy this situation, the Clayton Act was enacted in 1914. It prohibited specific trade practices that "may have an anticompetitive effect" and bypassed any governmental reluctance to sue to enforce the Act by enlarging the right of private parties to bring suits for damages under it.

The Sherman and Clayton Acts were followed by the Robinson-Patman Act of 1936, specifically designed to extend this protection to small retailers faced with price discrimination problems. The Federal Trade Commission Act, which was broader in scope, was passed at the same time as the Clayton Act. It created the Federal Trade Commission and gave the Commission power to issue orders, the violation of which is punishable by fines. This Act was also broadened during the depression with the passage of the Wheeler-Lea Amendments in 1938.

Despite this maze of laws, it is possible to eliminate, for present purposes, some areas that private industry might be concerned about. Both the Clayton Act and the Robinson-Patman Act pertain only to actual sales or acquisitions; therefore, joint planning discussions could not violate these laws.

On the other hand, violation of the Sherman Act only requires a conspiracy to restrain trade or monopolize and is no longer narrowly construed. It is certainly theoretically possible that an industry representative attending a joint planning session could be charged with violating the Sherman Act merely because of his participation in the discussion. Participation alone could be construed by the Department of Justice (DOJ) as an inference of intent to violate the Sherman Act even though no such intent actually exists. Nevertheless, the participant would have to be in some way engaging in a "restraint of trade." This term, of necessity, has never been precisely defined by the courts.

Nevertheless, the difficulties of proving an antitrust violation do not mean that there is not an antitrust problem here. Being a defendant in an antitrust action is very expensive. Most of the large corporations in the energy

DOJ's efforts should be guided by a practical understanding of the way advisory groups function in relation to governmental decision making. The DOJ should also be aware of the self-policing inherent in advisory groups comprised of men with a diversity of backgrounds in business and academia. However, it is perhaps less important whether the rules prove to be such that they permit or discourage private sector cooperation with DOE than it is to have a degree of certainty concerning possible antitrust action upon which businessmen (and government officials) can rely. If practical arrangements for bringing private industry's resources to bear upon the Government's programs to deal with the nation's future energy supply are precluded or severely limited by the antitrust laws, both the government and business executives should be aware of the situation. Rules or procedures that would enable businessmen to make a contribution without personal jeopardy or hazard to their business interests would have great value in achieving the nation's energy goals.

Concluding Remarks

Throughout this discussion of the legal constraints and barriers to DOE/private sector interaction, certain common threads prevail. It is recognized that it may not be possible to achieve entirely satisfactory solutions to important issues. It has already been noted that the interests of the government and individual companies can seldom be made completely compatible. Nevertheless, the current legal environment has many areas of uncertainty and unfairness from the private sector viewpoint. Efforts should be made to resolve the legal and policy difficulties in a way that encourages practical working relationships between DOE and the private sector.

field are well aware of this from their past experience. The time and costs involved in defending an antitrust suit are often staggering, and this alone can make a conservative corporate counsel hesitant to advise participation in joint planning activities. Demands for discovery of documents can result in disclosure of much sensitive information, regardless of the outcome of litigation.

There are other antitrust threats to joint planning participants. One is "conscious parallelism." Parallel business activity by competitors that is in any way related to matters discussed at joint planning sessions can be the basis for a law suit. Though the chance of liability is remote, a number of even more extreme theories have generated antitrust suits. Another threat is the Federal Trade Commission itself, which has broad investigative powers and applies standards even more nebulous than those of the Sherman Act. Finally, there are some federal courts which sometimes render inconsistent and vague decisions in this area and prevent prediction of legal results.

The number of possible scenarios that can occur during, after, or in conjunction with joint planning sessions makes it impossible to guarantee participants immunity from the antitrust laws. The only course open that eliminates antitrust liability entirely is to meet with industry representatives individually. Another option is to meet in open session. Unfortunately, the one-to-one meetings also eliminate and the open meetings deter the all-important interaction and debate which is the distilling process used to generate good advise and is the trademark of a good advisory body.

The Committee felt that DOJ should assume an active role in providing a framework for private sector cooperation with DOE. This could be done by prescribing specific guidelines that would protect DOJ's essential interests in preventing violations of the antitrust laws while at the same time clearly outlining the permitted range of activities. As an alternative, or perhaps in combination with the prescription of rules, the DOJ could establish a clearance procedure, which would enable industry leaders to present the specific proposed joint planning activity to a reviewing official or panel in the DOJ for clearance. This would remove any threat of liability or embarrassment as long as the activities were carried out in accordance with the approved arrangements. Of course, if the rules prove to be so restrictive that businessmen are precluded from any substantial interaction with DOE, or if the procedures are so elaborate and time-consuming as to set up procedural roadblocks, they will fail in their purpose.

CHAPTER VI

INSTABILITY AS A CONSTRAINT TO DOE/PRIVATE SECTOR COOPERATION

In addition to the legal uncertainties which tend to reduce the level of DOE/private sector interaction, certain other factors must also be taken into account when assessing the overall environment for cooperation. One of these is derived from the preoccupation of the industry executive with insuring the future success of his organization. This is particularly true of corporations engaged in the exploitation of major new energy options, since it is recognized at the start of a program that increasingly heavy investments over a period of ten years or more may be required before the new technology, if successful, will reach the marketable stage.

When joining with the government to conduct a cooperative project, the industrial executive naturally expects that the government commitment will be based on a planning commitment similar to his own, and that arbitrary shifts in national policy or agency resources will not curtail the program prior to its proper completion.

Unfortunately, in attempting to fulfill its part of the bargain, DOE suffers from several handicaps. Government appropriations are decided on an annual basis, and multi-year commitments can be made only under special circumstances. When government policy and resources are relatively stable, this poses no great hazard. However, when volatile political forces are continually at work, the danger to program stability can be great.

In the energy field, the recent history of government planning and program implementation scarcely inspires confidence. The Committee recognizes that a sound national energy policy requires the resolution of extremely complex issues, and that its stability depends on how well it is supported and understood by the public. The Committee is convinced that until reasonably stable national energy policies and goals are established and supported by the public, the full government/industry cooperation will not be achieved.

It should be noted that the lack of policy stability is most detrimental in the case of demonstration projects, and most severely in large programs requiring heavy investment over an extended period of time. In the research and development areas, where individual projects usually have a smaller dollar value and take less time to complete, commitments made by the government and industry can be fulfilled without much difficulty. It is in the demonstration stage of a new energy option, which paves the way for use of the new technology in the marketplace, that the most serious penalties for policy indecision are exacted.

Multi-year Budget Authorizations

The Committee spent some time discussing methods by which DOE could better signal to industry its intention to pursue a multi-year program to completion. One procedure that may have promise, providing Congress concurs, would be to employ multi-year authorizations in the budgeting process. While Congress usually appropriates on an annual basis, it is possible to authorize specific expenditures or commitments on a longer-term basis. The policy implications of a rolling multi-year authorization, perhaps covering the next two or three years of operations, would help to reinforce the mutual understanding between DOE and its industrial partners.

Management of Large-Scale Joint Projects

The Committee also wishes to comment briefly on one of the important management conflicts that has arisen in certain past ERDA programs. In large-scale development and demonstration programs funded jointly by government and industry, the issue arises as to which party should be given the primary responsibility for program management and execution. In some instances, quasi-public management corporations have been established to direct the programs, with board membership from both government and industry. Although this is desirable for various reasons, it fails to resolve the basic question of which side of the table should have the final right of decision.

The industry viewpoint is that programs of this kind are undertaken to make important new energy options ready for commercial use. Since industry has the most relevant background experience and probably the best appreciation of the requirements for successful commercialization, along with the greatest know-how and understanding of commercial practices, it follows that the private sector should have the larger voice in management of the project.

The government position is equally convincing for different reasons and reaches the opposite conclusion. In many cases, the magnitude of the government's financial contribution overshadows that of the industrial partner. Since the proper use of public funds is a responsibility of government officials that is non-transferable, in the event of differences of opinion the government view must prevail.

This, however, is somewhat in conflict with the experience during and after World War II, where the Atomic Energy Commission (AEC) National Laboratories were operated by contract managers. Except in the broad overall direction, there was no participation by the government in the project management or direction. While the contract manager technically functioned as the agent of the government, the overall independence of individual project directors made this a somewhat tenuous connection.

The Committee has not studied this matter in detail, and advances no recommendations for the proper conduct of future programs. Decisions should undoubtedly be made on a case-by-case basis, since the circumstances of individual programs will vary. It is clear, however, that a generally accepted set of management principles, arrived at after careful consideration of the relevant issues, will be a great help in easing the working relationships and increasing the attractiveness of DOE/private sector collaboration.

CHAPTER VII

THE RD&D PLANNING PROCESS

The Committee's principal assignment was to recommend means by which private sector participation in the ERDA (now DOE) RD&D planning process could be enhanced. From the start, the Committee was aware of the numerous interactions on RD&D matters that take place daily between representatives of individual companies and DOE personnel. Adding to this flow of information is the exchange of data and views at professional society meetings, the outpouring of articles in technical journals and the trade press, and the information gathered at specialized symposia and workshops (many of which have been sponsored by ERDA). In a broad sense, it can hardly be stated that the DOE staff is unaware of the diversity of private sector views on energy-related matters.

Nevertheless, the fact that this study was commissioned by ERDA indicates a feeling on the part of at least one segment of the agency's senior staff that the private sector input to RD&D planning was inadequate in important respects. According to briefings provided to the Committee, this also reflected the views of the Administrator of ERDA. Based on discussions with ERDA personnel, it appeared that a strengthened advisory input was needed in the very practical area of relating emerging new energy technologies to the realities of their utilization in the marketplace.

The training and experience of ERDA, and now DOE, staff members reflected, on the average, a heavy emphasis on technical expertise. But the successful utilization of a new technology is critically dependent on other factors as well. Among these are a realistic understanding of the cost factors, sound financial planning, a thorough understanding of the market structure, proper timing in the introduction of a new product, and an alert sensitivity to the changing competitive environment. For optimum RD&D program results, the Committee feels that there must be a continuing interchange of ideas and information between the research and development laboratory and the operating elements ultimately responsible for public acceptance and financial profitability. In their briefings to the Committee, ERDA personnel responsible for evaluating the federal program priorities have maintained that improved feedback of this kind from the private sector will increase the effectiveness of their RD&D planning and program implementation.

Virtually all government agencies engaged in technical activities have found it useful to enlist the aid of outside specialists who can objectively appraise their agency's plans for the future and monitor progress. Although they act in an advisory capacity, outside consultants can help to identify new opportunities in agency programs, avoid over-enthusiasm for internally generated "pet" projects, and provide a knowledgeable window to relevant activities occurring elsewhere. In order to fulfill this function, different agencies have used a variety of approaches over the years.

As a first step in its deliberations, the Committee commissioned a study background paper by Dr. Lawrence Goldmuntz of Economics and Science Planning, Inc., to appraise the techniques used by government agencies, past and present, to obtain outside advice and enhance the flow of information from outside sources. His report details and discusses several advisory mechanisms used by the National Advisory Committee for Aeronautics (NACA), the various branches of the Department of Defense, the Federal Aviation Administration, and various branches of the Department of Transportation. Dr. Goldmuntz's choice of examples typifies the approaches used by agencies with missions somewhat similar to those of ERDA.

The Committe recognized that whatever mechanism was selected, it would be subject to the constraints of existing legislation and therefore would be inhibited in its effectiveness. Of the mechanisms studied, the Committee selected the National Advisory Committee on Aeronautics (NACA) and the Air Force Scientific Advisory Board (AFSAB) as suitable structural models that could be used to devise a potentially effective advisory mechanism for DOE. Neither of these two models has been tested under the legal constriants requiring "openness." The NACA was disestablished prior to the legislation, and the AFSAB usually meets in closed session because of classified information involved in their deliberations. In both, members are selected from a broad spectrum of the U.S. technical and industrial community, with participation approximately equally divided between members associated with industry, and with universities and other non-profit organizations.

Although they do not provide a unique voice for the private sector viewpoint, these mechanisms have several advantages. First, their structure is conventional and the policies and procedures for their operation are well established. Second, as has already been noted, their effectiveness in satisfying agency needs, including the need for private sector contribution, has been excellent. Finally, while the legal environment has changed markedly during recent years, the operation of these mechanisms has not been challenged on either legal or political grounds. Industry members have not been constrained by the concern with antitrust or conflict-of-interest charges, and while their experience and knowledge was made available to the government, their status as private citizens serving the government in an advisory capacity also was not challenged.

The Committees' recommended structure for the advisory mechanism of DOE includes an Energy RD&D Advisory Board, four standing committees, ad hoc committees as needed to study specific issues or programs, and an Executive Committee chaired by the Secretary or Under Secretary of Energy, with members from both the DOE staff and the Energy RD&D Advisory Board.

The Energy RD&D Advisory Board

The Energy Research, Development, and Demonstration Advisory Board ("Energy RD&D Advisory Board") will report to the Secretary of DOE. The Board would consist of eighteen members, each appointed for a three-year term on a rotating basis so that six Board members complete their term each year. (It is recognized that the FACA limits the life of a committee to two years and the terms of its members to one year. The three-year term is considered important to insure adequate time for familiarization and for useful and productive service.) The Committee recommends that Board members may be appointed for two successive terms, but not more than two without an interruption of service. Members are appointed on the basis of their individual expertise and not as representatives of their employer-organizations. An approximately equal balance should be maintained between members with relevant industry backgrounds, and members drawn from other areas including universities and other non-profit organizations.

The primary responsibility of the Board will be to provide advice to the Secretary and his senior staff on matters relating to RD&D policy, program planning, and program review. In order to best fulfill these objectives, the composition of the Board should include scientists and engineers of established excellence in energy-related fields, industrial executives with proven technical leadership abilities, senior energy economists, and such other talents and skills as the Secretary may deem necessary.

Two members of the Board should be designated by the Secretary as Chairman and Vice Chairman, respectively.

Executive Committee

While the Board should retain a considerable degree of autonomy in establishing its agenda, experience with the Air Force Scientific Advisory Board and similar advisory groups indicates that it would be desirable for DOE to have a strong role in approving the work schedule for the Energy RD&D Advisory Board. Direct participation by DOE senior staff insures that the Board will be responsive to DOE needs and encourages DOE management to turn to the Board for advice when critical issues arise.

It is recommended, therefore, that an Executive Committee of the Board be established which would approve the initiation of all studies by the Board and its Committees. Once a study is approved, the responsibility for its conduct and completion lies with the Board. The Executive Committee should be chaired by the Secretary or Under Secretary of DOE. Other members should include the Chairman and Vice Chairman of the Board, the Director of the Office of Energy Research, and such other DOE senior staff members as the Secretary may select. The membership of Committees and Ad Hoc Panels should be subject to review and approval by the Executive Committee.

Standing Advisory Committees

Serving under the Board will be a series of five Standing Advisory Committees, with interests parallel to those of the Assistant Secretaries for Conservation and Solar Applications, Resource Allocations, Energy Technology, Environment, and Energy Research. (No recommendation is made here for the conduct of defense-related advisory functions, which should be handled separately for reasons of security.) The Committees shall be composed of Board Members and Associate Members, with a Member as Chairperson in each case; size should be on the order of six persons.

The primary functions of the Standing Committees will be to meet periodically with the appropriate Assistant Secretaries, to provide advice on such matters as he may request, to work with the Board on matters of common concern, and to serve as a liaison between the Board and the appropriate Assistant Secretary.

Ad hoc Advisory Panels

Specific, in-depth studies undertaken by the Board should be carried out by Ad Hoc Panels formed specifically for that purpose. These studies might include, for example, a detailed analysis of all relevant factors bearing on a proposed demonstration project or an in-depth study of the current status and future market potential of a particular technology. Ad Hoc Panels should be chaired by a Member or Associate Member, and should be composed of experts drawn from the Board and its Associates. When advisable, the panels may also include specialists recruited from the outside. Each Panel should consist of approximately six members and should be dissolved upon completion of its assigned tasks.

Associate Members

Thirty associate members shall also be appointed, in order to assist the Energy RD&D Advisory Board in conducting specific studies and to provide a core staff to serve as members of the Board's Committees and Panels. Their terms of service and provision for rotation shall be similar to those for the Board itself. The Associate Members should include technical specialists from the broad spectrum of the energy-related fields of science, engineering, and economics. As in the case of Members, an approximately equal balance shall be maintained between individuals with industry backgrounds and those drawn from universities and non-profit organizations. Associate Members should also be appointed as individuals, and not as representatives of their employer-organizations.

The responsibility of Associate Members is to serve as consultants to the Board. Appointment of an Associate Member to a Committee or Ad Hoc Panel can be accomplished expeditiously, since the necessary administrative processing and clearances will already have been completed at the time of appointment as an associate. Through the medium of an appropriately planned information system, Associate Members will be kept continuously aware of DOE plans and programs, and will have the opportunity to interact with senior DOE staff in their respective areas of interest. They thus comprise a knowledgeable group of experts, indoctrinated in DOE procedures and capable of conducting studies on a quick-response basis with a minimum of administrative delays.

No attempt is made here to describe the Board's administrative and operating procedures, including the requirement of an adequate administrative support staff. These should be tailored to DOE's preferences, taking into account the prior experience of other advisory mechanisms, such as the AFSAB. With the strong, yet not dominating, participation of members from industry in the activities of the Board and its subgroups, the Committee believes that this advisory mechanism has the potential to provide constructive and useful private sector participation in the DOE energy RD&D planning and program implementation provided that suitable legal guidelines can be established.

CHAPTER VIII

CONCLUSIONS AND RECOMMENDATIONS

A variety of corrections can be applied at various points in the government-industry relationship which, individually and in the aggregate, will contribute to more coherent and timely interaction in advancing energy research, development, and demonstration. However, this is bound to be a slow and piecemeal process at best, and its efficacy is by no means assured.

The crux of the problem is to be found in the separate institutional defenses that government and industry have erected over many years in the name of the public interest and the private interest. This system works well enough when each sector is concerned only with its respective goals and objectives. But it malfunctions when goals and objectives converge, as they do in a time of common danger or national emergency. When the resources of industry have to be coupled with the imperatives of national policy, a different working arrangement is called for. The principle of co-responsibility, where each brings to a common table his resources and talents to achieve a common objective, becomes operative, and the requirements of a collaborative relationship must moderate and reshape institutional defenses. The job cannot be done otherwise. The government's normal roles of regulation and supervision in the public interest are legitimate and necessary, up to the point where their exercise is counterproductive to that very interest.

In the case of energy-oriented research, development, and demonstration, the government has shaped its efforts so that they will dovetail with the commercialization responsibility of private industry. The national energy plan is built on the proposition of collaboration, but it is not a self-fulfilling proposition in the absence of workable terms of reference in which collaboration can be genuine and scaled to the proportions of the problems at hand. As long as the arrangements for effective cooperation are flawed, and the national research, development, and demonstration program is saddled with constraints which do not suit it, government-industry relationships will continue to be sorely troubled.

As a consequence of its studies, the Committee offers the following recommendations:

1. Private sector interaction with DOE in the area of research, development, and demonstration program planning and implementation can and should be substantially improved and strengthened. With the private sector responsible for the production, delivery, and utilization of energy in the marketplace, and DOE with the mission of securing our energy future, active and constructive exchange of knowledge and ideas between the two groups is essential to the national welfare.

2. A formal Energy Advisory Board along with associated standing committees and ad hoc Panels should be established. While DOE staff is able to maintain contact with industry representatives through individual meetings and the normal channels for technical communication, such as professional society activities and symposia, there is a need for a formalized and continuing advisory mechanism with strong industry participation to assist in the formulation of the DOE energy research, development, and demonstration program. Such an advisory mechanism is described in Chapter VII.

3. The Committee recommends that the Secretary give early attention to a review of the laws and regulations that affect those serving DOE in an advisory capacity, and that steps be taken to provide definitive guidelines controlling such service, which would reduce uncertainties and facilitate the DOE effort to enlist the very highest caliber of private sector advice. The legal framework for expert participation in DOE's RD&D planning must be clarified. However, it is equally important that the framework be designed to encourage the necessary private sector participation and sharing of responsibility for the nation's energy RD&D future. Without this needed clarification and encouragement, those who participate in, or cooperate with the Advisory Board may unnecessarily run the risk of conflicts-of-interest or antitrust allegations. Confidential data and information in their possession may become public knowledge. Private insights and privileged information--the most sought-after kind of advice--may not be forthcoming. Moreover, the comprehensive requirements of the Freedom of Information Act, The Sunshine Act, and The Federal Advisory Committee Act will discourage many excellent advisors from serving in DOE advisory bodies because of the probable vacuity of the exercise.

In particular, the Committee recommends that serious and prompt consideration be given to:

a. Promulgation of a comprehensive regulation explicitly protecting from disclosure all information not required to be disclosed by law which is given to the Advisory Board in confidence either by its participants or by others. Such a regulation should clearly state that its purpose is to serve as the legal basis of a suit to protect the confidentiality of the information. It will also serve as a DOE pledge to protect confidential information in the Board's hands.

b. Initiation of appropriate legislation to assure that the confidential disclosure of trade secrets to the Advisory Board will not destroy the element of secrecy necessary to legally protect the secret.

c. Modification of existing DOE patent policies to make waiver, march-in, and licensing determinations as predictable as possible, by providing more objective tests to be applied in such determinations. The current policies on government acquisition of patent rights leave a sense of uncertainty in the mind of the RD&D contractor. The Committee further recommends regulatory action to give DOE contracting officers expanded power, where appropriate, to negotiate for RD&D services without acquiring background patents. The exercise of DOE acquisition rights to background patents is equally uncertain in its application and should be mae as predictable as possible.

d. Promulgation of clear and stable regulations governing organizational conflicts of interest. These regulations should remove the current ambiguity surrounding potential losses of future RD&D contract opportunities by those organizations that cooperate with, or permit employees to serve as members of the recommended Advisory Board or its Committees and Panels.

e. Obtaining the cooperation of the Justice Department's Antitrust Division in evaluating the antitrust implications of the Advisory Board's activities. The Secretary should solicit from the Division guidelines that structure private sector participation in these activities, in order to comport with Division standards of antitrust scrutiny.

4. The Committee concluded that a consistent management plan and stable funding would be critical elements in a successful energy technology research, development, and demonstration program. The Committee wishes to call attention to the fact that typical RD&D programs, by their very nature, require many years for successful completion. Especially when large demonstration projects are undertaken jointly by DOE and industry, both parties require assurances that long-term commitments will be honored unless new technical information dictates changes or termination of the effort. In the absence of a relatively stable national energy plan, it is often difficult for the government to provide assurances of this kind for programs that require multi-year funding. Along with stable funding, a consistent management plan should be developed and adhered to in order to achieve mutually satisfactory results. The Committee emphasizes that without stability of this kind, DOE efforts in research, development, and demonstration will not fully serve their purpose of strengthening the nation's energy capabilities.

APPENDIX

AN ANALYSIS OF FIVE LEGAL PROBLEMS IN STRUCTURING PRIVATE SECTOR PARTICIPATION IN JOINT RD&D PLANNING

Submitted by

THE RESEARCH GROUP, INC.
P. O. BOX 7187
CHARLOTTESVILLE, VIRGINIA 22906

December 30, 1977

to

The Committee on Private Sector Participation
in Government Energy RD&D Planning

Special Projects

Commission on Natural Resources

National Research Council

PROJECT PARTICIPANTS

J. RAYMOND MIYARES, Project Director

J. PERRIN QUARLES, III, Project Manager

ROGER M. SINGER, Director of Research

DANIEL J. PACI, Director of Research

KENNETH T. BOWDEN, II, Research Associate

JAMES R. PUGH, Research Associate

DAVID K. ROSENBLUTT, Research Associate

TABLE OF CONTENTS

Introduction	55
The Conflict with the Government's Effort at Openness	59
The Acquisition and Protection of Proprietary Information	71
The Protection of Patent Rights	79
Organizational Conflicts of Interest	88
The Impact of Antitrust Considerations	100
Conclusions	111

APPENDIX

INTRODUCTION

As a preamble to the present study, it is certainly legitimate to inquire whether the U.S. Department of Energy (DOE) needs to engage in joint planning of its research, development and demonstration (RD&D) programs with the members of the private sector who will participate in those programs. DOE has, at its disposal, a wide variety of data acquisition mechanisms with which it should theoretically be able to obtain all the new information it needs to plan its RD&D program without the inconvenience of private sector participation. Indeed, the lack of raw information is apparently not at the core of DOE's difficulties in planning its RD&D programs, it seems unlikely that the Department's decision-making processes can be substantially improved, merely by injecting massive doses of additional data into it.

Nevertheless, it is clear that institutional mechanisms for the acquisition of raw data relevant to energy matters do not substitute for joint planning between the private and public sectors. Even if it is assumed that the existing statutory reporting requirements and data resources do not substantially overlap, there remains the problem of allowing these mechanisms to be regarded as providing all that is necessary for intelligent planning of RD&D programs. The difficulty which results from inadequate private sector participation in DOE's RD&D planning is not primarily in the accumulation of data, but rather in its evaluation, and in the planning of tasks undertaken on the basis of that evaluation. To be sure, there is no reason to believe that DOE's evaluation of the data it accumulates is, on the whole, less well informed than private industry's.[1] However, DOE's orientation requires it to maintain a focus on every technology and to be aware of the effects each has on the others. The comprehensiveness of DOE's perspective may arguably be supplemented, therefore, by a better understanding of the commercial implementation problems of an energy project.[2] It may surely be contended that DOE is not sufficiently aware of these difficulties which the private sector encounters once a research and development program is successfully concluded.

One partial method of remedying this problem appears to be greater long range joint planning. This planning must consider not only technological problems, but commercial ones as well, and must proceed with an eye toward the development of stable RD&D program policies. Both government and industry goals must be identified and considered. There must be projections and forecasts by economists and analysts of both as to each project's ultimate commercial feasibility. In addition, it would be helpful to set out, in advance, an overall strategy for each RD&D project, with criteria and milestones, culminating with commercial acceptance and profitability.

An obvious mechanism for implementing this objective is the creation of a network of advisory boards[3]—made up, in whole or in part, of private sector representatives—which would be charged with assuring that the business reality of commercializing new technology and the problems of policy instability are considered in each phase of the RD&D planning process. Of course, it cannot be assumed that such a network is the exclusive mechanism by which joint planning can be accomplished. Indeed, any number of alternative mechanisms—for example, greater reliance on academic organizations such as the National Academy of Science, government-industry exchanges of personnel[4] and information, and expansion of the DOE staff to accommodate the acquisition of judgmental information—may be conceived. Moreover, regardless of whether a formally structured board is created, substantial joint planning will continue to occur in more informal contexts as well.

APPENDIX

The present study addresses five specific areas of legal problems which may inhibit the joint planning of RD&D programs between the private sector and DOE:

The Government's Effort At Openness.
The Acquisition Of Proprietary Information.
The Disposition of Patent Rights.
Organizational Conflicts Of Interest.
Antitrust Considerations.

Each of these five problem areas can impact specifically upon a network of advisory boards, such as that contemplated here. However, the present study is not artificially restricted to exploring that impact. Instead, it attempts to address five specific and limited aspects of the law which will directly affect any joint RD&D planning.

NOTES

1. Indeed, the view was expressed at ERDA, before the creation of DOE, that its evaluation of the data it accumulated was, for the most part, better informed than the private sector's. Conversation with staff attorney, Office of the General Counsel, ERDA.

2. Telephone interview with Richard Begley, Director of Power Systems R&D, Research and Development Center, Westinghouse Electric Corp.

3. The Secretary is presently authorized to establish such advisory committees. See 42 U.S.C. § 5816(g). Indeed, a March, 1977, study lists 9 active energy committees providing advisory input to ERDA, before the creation of DOE:

   Advisory Committee on Geothermal Energy
   Atomic Energy Labor-Management Advisory Committee
   General Advisory Committee (GAC)
   General Technical Advisory Committee (GTAC)
   Lignite Advisory Committee
   Senior Utility Steering Committee
   Senior Utility Technical Advisory Committee
   Study Group on Field and Laboratory Utilization
   Task Force on Demonstration Projects as a Commercialization Incentive

   Subcommittee on Reports, Accounting, and Management of the Committee on Governmental Affairs, United States Senate, Energy Advisors: An

APPENDIX

Analysis of Federal Advisory Committees Dealing with Energy 11-12 (95th Cong., 1st Session, 1977). One committee which was not listed—perhaps because it is not, strictly speaking, engaged in policy advisory activities—but which may be considered in evaluating the feasibility of such boards is the Engineering Society Committee on Energy. This Committee recruits engineers from the private sector for a two-year term in Washington. ESCOE engineers, whose salaries are paid by ERDA, conduct analyses of specific technologies in fossil fuels. However, they are charged only with providing technological assessments. Telephone interview with Richard Hill, Director of ESCOE.

4. A model which may be considered in this regard is suggested by the Intergovernmental Cooperation Act of 1968, 40 U.S.C. § 531-535 and 42 U.S.C. §§ 4201-4244. This act provides for exchanges of personnel between federal agencies and either state and local governments or public and private, non-profit universities.

THE CONFLICT WITH THE GOVERNMENT'S EFFORT AT OPENNESS

Because DOE may be compelled, under FOIA, the Sunshine Act and FACA, to disclose its decision-making processes, private industry cannot be certain that confidential information it reveals to DOE in a joint planning effort will not be made available to the public. This danger may be most acute with respect to problems posed by products which are near the commercialization stage, and may stifle industry interest in providing exactly the type of information most critical to successful joint planning.
RECOMMENDED: A comprehensive regulation, explicitly protecting from disclosure all information given DOE in confidence, can partially remove the disincentive to aid in the development of energy RD&D policies and programs.

Some energy observers appear to have great faith in DOE's ability to keep confidential those sensitive matters which are communicated to it. Part of this faith seems to stem from the private sector's long-standing relationship and dealings with the U.S. Patent Office, which is regarded as virtually "leak-proof."[1] However, it may also be the result of a belief in some sectors that the various comprehensive agency-regulating statutes, dealing with opening the processes of government to public scrutiny, provide sufficient protection for confidential information revealed to DOE.[2]

Ironically, from the basic structure of these statutes, the Freedom of Information Act ("FOIA"),[3] the Government in the Sunshine Act[4] and the Federal Advisory Committee Act ("FACA"),[5] one may reasonably infer the opposite result. Certainly it would be sensible to predict that efforts to legislate openness in government have the effect of stifling industry interest in becoming involved in joint efforts with DOE to plan RD&D activities. The basis for such a prediction is obvious. It has been observed that one rationale for creating advisory boards to assist in DOE's RD&D planning is that these boards can offer a perspective on the commercial implementation difficulties which await a newly developed energy technology. Discussion of the specifics of these difficulties, however, may be incomplete if private sector participants cannot feel free to disclose certain types of confidential information and technological evaluations. Yet, they may be especially reluctant to disclose such information and evaluations without some reliable assurance that DOE will maintain its confidentiality.

Indeed, the one type of information which occasionally causes the private sector to avoid disclosure to DOE is that pertaining to products which are near the commercialization stage.[6] It may, therefore, be the case that, while the private sector is generally satisfied with the protection offered its confidential information, that protection is insufficient with respect to some of the information which is most critical to a successful advisory board.

FOIA was enacted in 1966, and subsequently amended, to provide formal notice by publication to persons affected by federal agency activities, and to make agency documents available for inspection by an interested public. However, the Act also contains several statutory exceptions which justify an agency's refusing disclosure of information which falls within one of nine exempt categories. Two of these exemptions seem to apply to the type of energy-related information that the private sector may hope would not be disclosed under the Act. These two protect "trade secrets and commercial or financial information obtained from a person and privileged or confidential;"[7] and "geological and geographical information and data, including maps concerning wells."[8] Nevertheless, the courts have applied the nine exemption provisions quite narrowly, and have carefully reviewed claims of exemptions to ascertain whether every element of the applicable provision is met before they have been willing to protect the information from disclosure.[9]

A private company desiring to participate with the government in energy RD&D planning can expect that it will not itself be compelled to reveal confidential information.[10] Moreover, some reassurance can be derived from the fact that, during its existence, ERDA was never challenged in the courts to defend the confidentiality of any of the information it had obtained.[11] However, nothing in the Act prohibits any agency from voluntarily disclosing the confidential information it acquires. Thus, while the Act does not require DOE to function within a framework that is plainly antagonistic to the private sector's interest in protecting the confidentiality of its information, neither does it require DOE to guarantee the protection that the private sector certainly desires when it assists in RD&D planning. Accordingly, it has been said:

> FOIA is neutral with respect to exempt information; it neither authorizes nor prohibits the disclosure of such information.[12]

Nevertheless, a number of federal courts have begun to grant relief preventing the disclosure of exempt information, pursuant to "reverse-FOIA" suits. This relief has been granted where disclosure violates another statute or an agency regulation, or constitutes an abuse of discretion.[13]

The statutory basis for a reverse-FOIA suit can be found in the Federal Non-nuclear Energy Research & Development Act of 1974.[14] In 1975, a section was added to that Act, providing:

APPENDIX

> The information maintained by the Administrator shall be made available to the public, subject to the provisions of section 552 of Title 5 and section 1905 of Title 18, and to other Government agencies in a manner that will facilitate its dissemination: Provided, That upon a showing satisfactory to the Administrator by any person that any information, or portion thereof, obtained under this section by the Administrator directly or indirectly from such person, would, if made public, divulge (1) trade secrets or (2) other proprietary information of such person, the Administrator shall not disclose such information and disclosure thereof shall be punishable under section 1905 of Title 18. . . .[15]

However, the scope of this limitation appears to be limited to information acquired by the Administrator—now the Secretary of Energy—for the purposes of developing an information bank of energy information, as authorized by that section.

On the other hand, the Secretary is authorized by the Energy Reorganization Act of 1974[16] to acquire "designs, processes, specification, and data,"[17] including trade secrets, apparently without any safeguards for the owners of such rights. Moreover:

> (e) Subject to the provisions of sections 2161 to 2166 of this title [dealing with atomic energy], and other applicable law, the Administrator shall disseminate scientific, technical, and practical information acquired pursuant to this subchapter through information programs and other appropriate means, and shall encourage the dissemination of

> scientific, technical, and practical information relating to energy so as to enlarge the fund of such information and to provide that free interchange of ideas and criticism which is essential to scientific and industrial progress and public understanding.[18]

Whether the term "other applicable law" includes the prohibitions of the information bank section appears doubtful. Therefore, it seems a rather difficult task to prevent disclosure purely on the basis of the dissemination section.[19]

An alternative basis may be DOE's regulations. However, regulations adopted by DOE affect the proprietary information only of those who contract with DOE, as opposed to those who might confidentially communicate with DOE in a noncontractual setting. Certain contract clauses, which are to be used in DOE procurement contracts to protect confidential information are specified.[20] This, however, is the limit of existing regulatory protection.

Regulations proposed by ERDA before the creation of DOE, but as yet not promulgated,[21] seek to define more clearly the status of confidential information involved in RD& D contracts. These proposals, however, do not remedy the lack of a regulation explicitly protecting such information from disclosure.[22]

In the absence of such a regulation, and in light of the statutory scheme which requires an administrative determination before protection is afforded, a reverse-FOIA action may ultimately be based on an allegation that discretion has been abused in that determination. Although "abuse of discretion" is a somewhat nebulous term, a few grounds for a finding of such abuse have been specified:

> If the disclosure of exempt information would constitute a criminal offense, such disclosure would be a clear abuse of the agency's discretion.[23]

Moreover:

> [T]he disclosure of the exempt information in the face of government representations of confidentiality was, on the facts present here, an abuse of discretion.[24]

Nevertheless, the reverse-FOIA cause of action may not go as far as it should toward rebalancing the rights of parties who have an interest in confidential information revealed to DOE. Indeed, a more important factor in this regard may be DOE's own practices designed to assure that information revealed to it by the private sector will not be disclosed. DOE's practice divides the information made available to it into four classifications:

- Information made available as required in a contract with DOE. This data is normally made available to the public.
- Information needed by DOE for internal review. Some of this is edited and published to stimulate inter-industry interest. That which is proprietary is kept confidential.
- Proprietary information which DOE looks at, but does not keep, so that it does not have documentation which can be the subject of an FOIA action.
- Exempt information, including data not relevant to the particular contract involved.[25]

DOE appears to be taking the position that only the first listed classification of information is subject to disclosure. Within the second classification, however, DOE may be willing—as have other agencies such as the Environmental Protection Agency—to argue that confidential information which has been collected in order to steer DOE's RD&D activities does not lose the character of its confidentiality merely because it is the object of a DOE contract. However, although skilled legal counsel may succeed in sustaining DOE's position in court, the fact that litigation would be necessary to protect valued information and technological evaluations is a factor which may inhibit private sector participation in DOE's planning activities.[26]

While a proposed joint industry-government RD&D planning panel may not itself be an "agency," as defined in subsection (e) of the Act, the product of its efforts, submitted to the agency itself, can be protected only by a successful argument that it fell within the intra-agency memorandum exception.[27] Once again, this would involve protracted litigation with uncertain chances for success—given the attitude of the federal courts in applying FOIA.

While FOIA gives the public access to printed material, the open meeting provisions of the Government in the Sunshine Act serve as a companion statute by giving the public the right to sit in on the oral deliberations of an agency. In a manner similar to FOIA, the "open meetings" portion of the Sunshine Act may have the effect of dampening the enthusiasm of a private entity which submits proprietary information or data to ERDA. That portion of the Act[28] requires that most agency meetings be open to the public. It also contains provisions which make it exceedingly difficult for an agency to hold a meeting behind closed doors. Where deliberations are so conducted, a complete transcript or electronic recording must be kept and must then be made available to the public. It was anticipated by the framers of the legislation that, given the intentionally burdensome procedures for closing a meeting, almost all agency activity would be conducted in public view.[29] Material might be excised from the transcript under the same "trade secret" exception that applies to FOIA, but only as that exception has been construed by the courts in decisions interpreting that law. Thus, private sector participants in DOE RD&D planning programs once again have some cause to fear that information which they would rather keep from the reach of competitors may not be so protected.

When contemplating the possibility of involving representatives of the private sector in a formalized RD&D planning process, one must recognize the additional effect of the Federal Advisory Committee Act on the ability of government to convince industry of the benefits of making a contribution. Enacted on October 6, 1972, FACA has broad application and contains stringent disclosure provisions which may well discourage participation in RD&D planning by any corporation which is concerned with keeping its ideas and developmental successes confidential. The Act is designed to accomplish the dual primary purposes of:

° Eliminating non-productive advisory panels, by mandating review by Congress and the President, by setting limits on the salaries of members and by establishing two-year limits on the "life" of a committee; and

° Regulating the activity of advisory committees.

FACA mandates that meetings of advisory committees be open.[30] It also renders the research, results of studies, and other data compiled by an advisory panel available to public scrutiny. This provision—perhaps more than any other—can therefore be seen as having the effect on private parties of raising a caveat to possible disclosure of information regarding new technologies. An advisory committee can close its doors to the public only by ensuring the availability of a transcript.

FACA not only combines the features of FOIA and the Sunshine Act, which serve to inhibit the flow of information from the private sector to government agencies, but also is directly aimed at the type of advisory board which is contemplated in the present study. As one court has noted, the very purpose of FACA is "to open to public scrutiny the manner in which government agencies obtain advice from private individuals. . . ."[31]

Moreover, there is nothing that an advisory committee can do to prevent disclosure of confidential information to its own participants. Yet, some of these participants may be the very persons to whom it is most feared disclosure would be made. Thus, the problem of confidentiality draws the viability of advisory committees as a mechanism for joint RD&D planning into question in those contexts where fear of disclosure is most pronounced.

Although private sector cooperation is an expressed goal of the DOE, that goal may well prove difficult to achieve. The restructuring of the energy administrative process will not solve the fundamental problem that the risk of public disclosure of information by the private sector will continue to serve as a disincentive for private industry to aid in the development of energy RD&D policies and programs. Even a comprehensive regulation, explicitly protecting from disclosure all information given DOE in confidence, can only partially remove that disincentive.

NOTES

1. Telephone interview with G. Edwin Brown, Jr., a leading atomic energy consultant.

2. Telephone interview with Richard Begley, Director of Power Systems R&D Research and Development Center, Westinghouse Electric Corp.

3. 5 U.S.C. § 552.

4. Pub. L. No. 94-409, 90 Stat. 1241 (Sept. 13, 1976).

5. 5 U.S.C. App. I §§ 1 et seq. (1972).

6. Telephone interview with Richard Begley, supra note 2.

7. 5 U.S.C. § 552(b)(4).

8. 5 U.S.C. § 552(b)(9).

9. See, e.g., National Parks and Conservation Association v. Morton, 498 F.2d 765 (D.C. Cir. 1974).

10. See Washington Research Project, Inc. v. Department of Health, Education & Welfare, 504 F.2d 238 (D.C. Cir. 1974), cert. denied, 421 U.S. 963 (1975).

11. Telephone interview with a staff member, Office of the General Counsel, ERDA.

12. Charles River Park "A", Inc. v. Department of Housing and Urban Development, 519 F.2d 935, 942 (D.C. Cir. 1975).

13. Note, "Protection from Government Disclosure—The Reverse-FOIA Suit," 1976 Duke L.J. 330, 340, cited with approval in Westinghouse Electric Corp. v. Schlesinger, 542 F.2d 1190, 1197-98, n. 13 (4th Cir. 1976). See also Note, "Reverse Freedom of Information Act Suits: Confidential Information in Search of Protection," 70 Northwestern L. Rev. 995 (1976); Project, "Government Information and The Rights of Citizens," 73 Mich. L. Rev. 971 (1975).

14. 42 U.S.C. §§ 5901 et seq. (1974).

15. 42 U.S.C. § 5916 (1976 supp.).

16. 42 U.S.C. §§ 5801 et seq. (1974).

17. 42 U.S.C. §§ 5817(d) (1976 supp.).

18. 42 U.S.C. §§ 5817(e) (1976 supp.).

19. DOE also has considerable power to acquire technical information from the private energy industry under 15 U.S.C. §§ 772(c), (e), 791(a).

20. 41 C.F.R. Part 9-7.

21. 40 Fed. Reg. 48363-48381 (1975).

22. Telephone interview with a staff member, Office of the General Counsel, ERDA.

23. Metropolitan Life Insurance Co. v. Usery, 426 F. Supp. 150, 170 (D.D.C. 1976). Note that the scope of 18 U.S.C. § 1905 as applied under exemption (b)(3) of the Act is now no greater than the scope of exemption (b)(4) of the Act. 426 F. Supp. at 158, n. 15. Therefore, information not exempt under (b)(4) cannot be deemed exempted by the application of § 1905 under (b)(3).

24. Id., 426 F. Supp. at 170.

25. Telephone interview, supra note 11.

26. Telephone interview with James Nelson, Office of the General Counsel, EPA.

27. 5 U.S.C. § 552(b)(5).

28. 5 U.S.C. § 552(b).

29. H.R. Rpt. No. 94-880, 1976 U.S.C. Cong. & Admin. News 2183 et seq. In practice, since the Sunshine Act is directed at agency meetings, rather than documentary information, the Act may be more applicable to regulatory agencies, while sponsoring research bodies are more concerned with the impact of FOIA. No such distinction is explicitly made by law, however. 1976 U.S.C. Cong. & Admin. News at 2185.

APPENDIX

30. 5 U.S.C. App. I, § 10(a)(1).

31. *Food Chemical News, Inc. v. Davis*, 378 F. Supp. 1048, 1051 (D.D.C. 1974).

THE ACQUISITION AND PROTECTION OF PROPRIETARY INFORMATION

> DOE presently has statutory authority to acquire information, including trade secrets, on all energy resources and technology. However, the threat of disclosure of valuable proprietary information presently inhibits the private sector's willingness to cooperate fully by providing DOE with such information in joint RD&D planning. RECOMMENDED: A uniform codification of federal policy with regard to trade secrets communicated to the government, or at least to energy-related agencies, is required. Such a statutory scheme should define trade secrets, prohibit their public disclosure and provide civil sanctions for such disclosure.

The preservation of technology and commercial information by the law of trade secrets is a judicially created alternative to the patent and copyright laws.[1] Existence of a trade secret[2] gives rise to a property right which affords a competitor an advantage not available to others. Like the owner of a patent or copyright, the possessor of a trade secret—whether a formula, a pattern, a device or merely a compilation of data—may transfer this information to others or, through appropriate legal action, prevent its unauthorized use or disclosure.[3]

Federal agencies have taken a variety of approaches to the acquisition and protection of private parties' trade secrets. When acting within the statutory scope of its authority, an agency's power to acquire information is "no longer significantly affected by [its] confidentiality."[4] Congress, however, has failed to provide many remedies for trade secret violations.

The importance of trade secret protection to successful RD&D planning is obvious. If DOE is to avoid expending its resources repeating the work that the private sector has already undertaken, then it must be knowledgeable of the activities of those firms which are at the leading edge of the developing technology. However, these are precisely the firms which are likely to possess trade secrets in the form of technical information which is not yet ready for patent or copyright protection. There can be no doubt that some form of protection for these secrets is needed if the private sector is to be encouraged to divulge them to DOE This becomes increasingly true as the secret seems closer to translation into a commercial product. Yet, it is precisely DOE's desire to be able to anticipate commercial realities so that it may more effectively accommodate them in its RD&D planning.

In focusing upon this problem, it is necessary to examine the judicially created common law which has given definition to the concept of trade secret, as well as the recently developing federal legislative activity. Critical to the present examination, of course, is the protection that representatives of industry—competitors—are afforded when they are asked or expected to reveal sensitive market information, research plans or data.

In determining whether information constitutes a trade secret, six factors to be considered are:

- The extent to which the information is known outside of the firm;
- The extent to which it is known by employees and others involved in the firm;
- The extent of measures the firm takes to guard the secrecy of the information;
- The value of the information to the firm and to its competitors;

- The amount of effort or money expended in developing the information;
- The ease or difficulty with which the information could be properly acquired or duplicated by others.[5]

Since secrecy is a necessary element of a trade secret, once it is effectively disclosed, the original possessor loses its property right, and the information enters the public domain. Of course, it is not required that only the proprietor of a business know a trade secret. All employees involved in its use, as well as those independently licensed to use—but not disclose—it, may know a trade secret.[6]

On these points, most courts are uniform. The law is, unfortunately, far less defined with regard to whether a possessor of a trade secret loses his property right upon its disclosure in the course of dealing with a federal administrative agency. Although there appears to be no hard precedent answering this question, a negative answer may be inferred from certain administrative decisions.[7]

Merely because the owner of a trade secret is compelled to communicate it to a federal agency, it cannot be said that it has failed to take such measures as are reasonable to protect its secrecy. The owner itself, however, must continue to treat such communicated information as a trade secret in which it maintains a proprietary interest. A restrictive marking or legend on reports, prints or drawings which contain trade secrets is frequently utilized to confirm that the government is intended to be entitled to take only limited rights in the confidential data.[8]

Judicial recognition of the legal import of such restrictive markings, however, has been limited at best.

In International Engineering Co. v. Richardson,[9] for example, a federal district court concluded that the striking of a restrictive legend for data, in which an Air Force contractor claimed a property interest, together with its subsequent communication to the contractor's competitors, constituted "an adjudication of the contractor's proprietary interest by the contracting officer."[10] It therefore determined that the procedural due process requirements of adequate notice and a full hearing were appropriate. The court cited no direct authority for its conclusion, however, and its holding was subsequently reversed on jurisdictional grounds.

Judicial allowance of recovery against the federal government for misappropriation of a trade secret also recognizes that the status of the information as a trade secret does not terminate upon its communication to a federal agency.[11] The owner retains its property rights in the trade secret, including its right to sue for wrongful disclosure and misuse of the secret. Trade secret status may, however, be terminated if a federal agency discloses the secret information to third parties, or if the owner and agency agree to do so.

It may be possible to obtain relief in the federal courts for a federal employee's improper disclosure of a trade secret, where the action has a contractual basis[12] or where an action under the Federal Tort Claims Act[13] is appropriate. The relative value of a judicial remedy—damages or an injunction—in satisfying private participants in joint RD&D planning must be questioned, however. Only an implied contractual basis for relief presently exists. Moreover, the possibility of recovery for wrongful disclosure of trade secrets divulged during a DOE joint planning session is untested.

Agency employees who wrongfully divulge trade secrets may be subject to mild criminal sanctions.[14] The federal statute making such disclosure a misdemeanor provides for a maximum fine of $1000 or imprisonment not exceeding one year, or both. A federal employee found guilty of such a criminal violation must also be terminated. However, this statute appears to provide an ineffective deterrent and, though it has been in effect for almost 30 years, it has yet to be applied in a reported case.

The Congressional mandate to DOE to protect items it identifies as trade secrets[15] may be of little solace to one providing confidential information to that Agency. Rather, DOE's authorization even to acquire such confidential information merely illustrates that, once such data enters the federal regulatory system, the opportunities for its disclosure abound. The leaking of trade secret information by an employee of a federal agency is certainly of concern to private industry participants in joint RD&D planning. However, perhaps of even greater concern to a firm providing DOE with confidential, proprietary information, in the course of joint RD&D planning is the possibility of a DOE employee's leaving the federal government to go to work for a competitor in the energy field.

In the private sector, trade secret litigation frequently arises from the employer-employee relationship. The most important aspect of this employment relationship is that it is a fiduciary one.[16] An employee may not divulge or use trade secrets of his employer while still in his employ.[17] Not only does this duty of loyalty extend beyond the term of employment,[18] but frequently the employment contract of a key employee—whether manager, inventor or salesman—may contain a "restrictive covenant" clause preventing the employee from seeking employment with a competitor of his employer's for a fixed period and over a specific geographic region. Such clauses, when reasonable, may be enforceable against both the former employee and his new employer through an action for injunctive relief or damages, or both.[19]

No safeguards against a former DOE employee's taking confidential information to his new employer presently exist. Present criminal sanctions for disclosure of confidential information apply only to federal employees, not former employees.[20] Nor may any protection against such an occurrence be possible, since the practicality of enforcement of any civil or criminal statutes extending to former government employees is problematic at best. Nor would a restrictive covenant for DOE employees, analogous to the noncompetition clause utilized in the private sector, seem to be an appropriate remedial device. To bar DOE employees from seeking future employment in energy-related industries would certainly limit the number of individuals willing to seek employment with that Department.

Because the statutory protections against DOE's disclosure of trade secrets are so thin, and because the availability of a common law remedy for unauthroized disclosure is uncertain—and its pursuit quite costly—there remains the problem of creating a device to reassure the private sector that it will not be risking financial loss if it discusses its trade secrets with DOE. A partial solution for this problem may be the enactment of legislation providing that, where DOE wrongfully uses or discloses trade secrets in violation of a valid restriction imposed by the owner, the owner's exclusive remedy is to sue the United States for damages.[21] Such remedial legislation, however, will not resolve the problem of disclosure by a former DOE employee. An extension of present criminal sanctions to include former federal employees, as well as a strengthening of the punitive measures involved, may serve as some deterrent against disclosure, but the problems of imposing severe criminal sanctions for this type of activity will remain.

Thus, it may be necessary to create some form of statutory civil sanction for wrongful disclosure—either in the form of a civil penalty or by way of a new cause of action.

NOTES

1. E. Kintner & J. Lahr, An Intellectual Property Law Primer 117 (1975).

2. The most comprehensive and commonly accepted definition of a trade secret is that found in § 757, Comment b, of the Restatement of Torts (1939):

> any formula, pattern, device or compilation of information which is used in one's business, and which gives him an opportunity to obtain an advantage over competitors who do not know or use it. It may be a formula for a chemical compound, a process of manufacturing, treating or preserving materials, a pattern for a machine or other device, or a list of customers.

3. R. Milgrim, Trade Secrets § 1.01 (1977).

4. Gellhorn, "Protecting Trade Secrets in the Administrative Forum," P.L.I., Protecting & Profiting from Trade Secrets 183 (R. Milgrim 1975).

5. Restatement of Torts § 757, Comment b (1939).

6. Id.

7. See generally, Kostos, "Unauthorized Use of the Technical Data in Government Contracts: Remedies of the Data Owner," 6 B.C. Ind. & Com. L. Rev. 753 (1965).

8. See, e.g., International Engineering Co. v. Richardson, 367 F. Supp. 640 (D.D.C. 1973), rev'd, 512 F.2d 573 (D.C. Cir. 1975), cert. denied, 423 U.S. 1048 (1976). Kostos, supra, at 753.

9. See note 8 supra.

10. 367 F. Supp. at 654.

11. *Pabloc Co. v. United States*, 137 U.S.P.Q. 224 (Ct. Cl. 1963).

12. *See* *International Engineering Co. v. Richardson*, *supra* note 8.

13. 28 *U.S.C.* § 2674.

14. 18 *U.S.C.* § 1905.

15. 42 *U.S.C.* § 5916.

16. *See*, *e.g.*, *Olschewski v. Hudson*, 87 Cal. App. 282, 262 P. 43, 44 (1927) (laundry route employee); *Town & Country Houses & Homes Services, Inc. v. Evans*, 150 Conn. 314, 189 A.2d 390, 392 (1963); *B.F. Goodrich Co. v. Wohlgemuth*, 117 Ohio App. 493, 192 N.E.2d 99, 105 (1963). *But see* *American Stay Co. v. Delaney*, 211 Mass. 229, 97 N.E. 911, 913 (1912) (bare employer-employee relationship is not a fiduciary one).

17. *See*, *e.g.*, *Fidelity Appraisal Co. v. Federal Appraisal Co.*, 217 Cal. 307, 18 P.2d 950, 954 (1933); *Cameron Machinery Co. v. Samuel Langston Co.*, 115 A. 212, 214-15 (N.J. Ch. 1921).

18. *Byrne v. Barrett*, 268 N.Y. 199, 197 N.E. 217 (1935) (duty flowing from relationship is absolute and continues after termination of employment).

19. *See* Milgrim, *supra* note 3, at § 3.05[1], at 3-67 to 3-84.

20. *See* 18 *U.S.C.* § 1905. *See also* Kintner & Lahr, *supra* note 1.

21. Such a remedial statute was the *Foreign Assistance Act of 1948*, Pub. L. 80-472, 62 Stat. 137 (April 3, 1948), subsequently repealed. Under that Act, where the Economic Cooperation Administration used or disclosed trade secrets in violation of restrictions imposed by the owner, the exclusive remedy of the owner was to sue the United States for damages in federal district court. The head of that agency had authority to settle such claims before suit. *See* Kintner & Lahr, *supra* note 1 at 219-20.

THE PROTECTION OF PATENT RIGHTS

Because they are directed at the contractual relationship between DOE and a party offering RD&D services with respect to a particular project, DOE's patent policies concerning waivers, march-in rights, licensing, and background patents have little, if any, direct effect on the willingness of the private sector to participate in joint planning. Nevertheless, apart from any direct inhibition on such participation, DOE's present policies may induce an attitude in the private sector which is not responsive to the need for cooperation.

RECOMMENDED: DOE should promulgate regulations making waiver, march-in and licensing determinations as predictable as possible, by providing objective standards, where practical, for such decisions. The power of the DOE contracting officer negotiating background patent rights may be expanded to determine the government's need for such on a case-by-case basis.

The policy of DOE with respect to patents is governed by § 9 of the Federal Non-nuclear Energy Research & Development Act of 1974.[1] Section 9 resolves the long-standing debate over who should own the rights to inventions developed in the course of government-sponsored RD&D programs by vesting title to patents in the United States.

In order to achieve DOE's goal of early commercial application of energy discoveries, however, the private sector has deemed it necessary to obtain incentives to venture capital in the area of energy RD&D. Accordingly, § 9(c) of the 1974 Act allows the government to waive its rights in an invention to the inventor. In making a waiver decision, DOE is required to consider four primary objectives:

° Making the benefits of the energy research, development, and demonstration program widely available to the public in the shortest practicable time.

° Promoting the commercial utilization of such inventions.

° Encouraging participation by private persons in the Administration's energy research, development, and demonstration program.

° Fostering competition and preventing undue market concentration or the creation or maintenance of other situations inconsistent with the antitrust laws.

A waiver may be granted at one of two stages in the RD&D process. Section 9(d) of the 1974 Act provides for the negotiation of a waiver at the time of contracting. Eleven statutory criteria are provided for DOE's consideration in deciding whether such a waiver would be appropriate.[2] In addition, the 1974 Act allows waivers to be granted after an invention is identified. In determining whether such a waiver is in the best interests of the United States, eight of the same criteria must be considered. In addition, the Secretary is required to consider:

° The extent to which such waiver is a reasonable and necessary incentive to call forth private risk capital for the development and commercialization of the invention; and

° The extent to which the plans, intentions, and ability of the contractor or inventor will obtain expeditious commercialization of such invention.[3]

Notwithstanding the fact that a waiver has been granted, it may be terminated if a contracting inventor has not taken sufficient steps to utilize it in a practical manner within a reasonable time. DOE also may grant a non-exclusive or partially exclusive license on an invention, to which the government has waived its rights in other specified situations.[4] These limitations on the waiver principle are known as "march-in" rights. These rights may also be invoked when the contractor is not commercializing the invention, or the exclusivity of the waiver is determined to tend toward violation of the antitrust laws. However, in these situations, the government's right may not be exercised until four years after the effective date of the waiver.[5]

DOE's regulations governing waivers follow the general considerations enumerated by the 1974 Act.[6] When these regulations were first proposed in October, 1975, there was a great deal of skepticism on the part of the private sector as to whether the waiver provisions would constitute a significant exception to the statutory policy of maintaining title to patents in the government.[7] In 1976, however, approximately 40% of the advance waivers requested were, in fact, granted.[8] While a few requests were denied, most of the remaining number are pending decision.

When a waiver is refused or is not sought by a party contracting with DOE, the inventor normally retains a revocable or irrevocable, nonexclusive, paid-up license for practice of the invention. DOE may grant an exclusive or partially exclusive license to a third party, even though the inventor also retains a right to practice it. While a contractor's license to practice an invention may be revoked, the regulations on this point provide:

> The contractor's nonexclusive license retained in the invention may be revoked or modified by [DOE] only to the extent necessary to achieve expeditious practical application of the

> invention pursuant to an . . . exclusive license for the invention.[9]

According to § 9(g)(2) of the 1974 Act, an exclusive or partially exclusive license may be granted, only if, after a hearing, it is determined:

- The public interest will best be served by the proposed license, in view of the applicant's intentions, plans, and ability to bring the invention to the point of practical or commercial applications;
- The desired practical or commercial applications have not been—or are not likely expeditiously to be—achieved, under any nonexclusive license which has been, or may be granted on the invention;
- Exclusive or partially exclusive licensing is a reasonable and necessary incentive to call forth risk capital and expenses to bring the invention to the point of practical or commercial applications; and
- The proposed terms and scope of exclusivity are not substantially greater than necessary to provide the incentive for bringing the invention to the point of practical or commercial applications and to permit the licensee to recoup its costs and a reasonable profit.

An issue paralleling the question of the relative rights of DOE and a contractor in an invention concerns the background patents which the contractor has developed in a specified area of energy technology. Normally, a contractor selected to perform work under a DOE contract has developed a degree of expertise in the field to which the contract relates. The patentable results of such research, however, may be necessary to promote DOE's goal of the prompt commercial utilization of such technology. Accordingly, DOE's regulations specify a contract clause which is to be included in DOE contracts exceeding $250,000.[10] DOE may also require the licensing of background patents to third parties.

In addition to the background patent provision, a party contracting with DOE must allow access to its records relating to inventions. Under DOE's stipulated contract provisions, a contracting officer or his authorized representative has the right to review all of the contractor's books, laboratory data and notes, as well as records and documents.[11]

DOE regulations concerning waivers, march-in rights, exclusive or non-exclusive licenses, revocable or irrevocable licenses, and background patent rights are obviously of deep concern to potential DOE contractors. Nevertheless, DOE's patent policies may not be invoked until a contractual relationship is established between DOE and a party which is offering RD&D services with respect to a particular project. For this reason, DOE's patent policies may have little, if any, direct effect on the willingness of the private sector to communicate with DOE concerning the best possible way of utilizing its resources for RD&D programs. It is doubtful that DOE's patent policies or regulations alone inhibit a private entity from participating on an advisory board which has the purpose of focusing DOE's activity on feasible commercial ventures.

This conclusion, however, cannot be drawn in the case of legislation that establishes the compulsory licensing of patents held by third parties not in privity with DOE. Such a provision, similar to those contained in the Atomic Energy Act,[12] and the Clean Air Act,[13] has been proposed in some quarters. If it were enacted, the private sector would be highly interested in protecting proprietary rights in its patents and other data. Accordingly, there would be a disincentive to any communication with government agencies, such as DOE, which might lead to the loss of exclusive rights in such property. The royalty rights which accompany mandatory licensing are not thought to be sufficient compensation for the commercial development of an invention.[14]

Apart from any direct inhibitions on the communication between DOE and its contractors, DOE's present patent policy may, in certain cases, induce an attitude which is not responsive to the need for cooperation in the achievement of its goals. It is axiomatic that the primary motive of private companies in contracting, or otherwise cooperating, with DOE is desire for profit. However, DOE's patent policies may affect a contractor's perception of its ability to achieve a suitable return on the investment it commits to DOE RD&D programs. Obviously, a potential contractor's perceptions in this regard will also be the most important consideration in its determination to enter a contractual relationship with DOE.[15]

A DOE contractor often commits a large amount of its own capital to the commercial development of an invention.[16] However, to the extent that uncertainty is introduced into a particular program, a potential contractor's willingness even to engage in planning activities with DOE will be reduced. From the viewpoint of the private sector, the ideal situation would be to vest title to patents, arising out of government sponsored RD&D programs, in the contractor as a matter of course. Since statutory provisions prevent this, a contractor interested in receiving funds from DOE will frequently seek the security offered by a waiver of the government's rights in a patent.

In order to promote private sector participation in DOE RD&D planning it seems desirable to make waiver, march-in and licensing determinations as predictable as possible. However, DOE's regulations simply follow the statutory provisions of the 1974 Act by enumerating factors to be considered by DOE. Conceivably, the regulations could be restructured so as to provide a more objective test.

One of the greatest fears which businesses have with regard to transacting with DOE is the provision for the government's acquisiton of the background patents of a contractor.[17] The private sector obviously fears the loss of investment in prior research, and this provision means that the benefits of such research can be extended to a firm's competitors. Thus, while the background patent provisions are intended to promote a rapid diffusion of technological information, the opposite result may occur in some cases, since some businesses may prefer to protect their investment in prior research by avoiding contact with DOE entirely. This problem is a particularly difficult and emotional one, for which no satisfactory solution can probably be offered. However, a helpful approach may be to expand the power of the ERDA contracting officer negotiating such rights to determine the need of the government for background patents on a case-by-case basis.

NOTES

1. 42 U.S.C. § 5908.

2. The criteria called for in § 9(d) are:

> (1) the extent to which the participation of the contractor will expedite the attainment of the purposes of the program;
> (2) the extent to which a waiver of all or any part of such rights in any or all fields of technology is needed to secure the participation of the particular contractor;
> (3) the extent to which the contractor's commercial position may expedite utilization of the research, development, and demonstration program results;
> (4) the extent to which the Government has contributed to the field of technology to be funded under the contract;
> (5) the purpose and nature of the contract, including the intended use of the results developed thereunder;
> (6) the extent to which the contractor has made or will make substantial investment of financial resources or technology developed at the contractor's private expense which will directly benefit the work to be performed under the contract;
> (7) the extent to which the field of technology to be funded under the contract has been developed at the contractor's private expense;
> (8) the extent to which the Government intends to further develop to the point of commercial utilization the results of the contract effort;
> (9) the extent to which the contract objectives are concerned with the public health, public safety, or public welfare;
> (10) the likely effect of the waiver on competition and market concentration; and
> (11) in the case of a nonprofit educational institution, the extent to which such institution has a technology transfer capability and program, approved by the Administrator as being consistent with the applicable policies of this section.

3. 42 U.S.C. § 5908(e).

4. *See* 41 C.F.R. § 9-9.109-6 (i)(9).

5. *See generally*, 42 U.S.C. § 5708(h).

6. *See* 41 C.F.R. § 9-9.109-1.

7. *See*, *e.g.*, P. Sperber, "Government Contracting: Perpetuating the Energy Crisis," 62 A.B.A.J. 1301 (1976).

8. Confidential telephone interview with ERDA Patent Counsel.

9. 41 C.F.R. § 9-9.107-3(b).

10. See 41 C.F.R. § 9-9.107-5(k)(2).

11. See 41 C.F.R. § 9-9.107-5(h).

12. 42 U.S.C. § 2183. This section is a limited one which applies only if:

> (1) the invention or discovery covered by the patent is of primary importance in the production or utilization of special nuclear material or atomic energy; and
> (2) the licensing of such invention or discovery under this section is of primary importance to effectuate the policies and purposes of this Act.

The power it originally delegated to the Atomic Energy Commission was transferred to ERDA by 42 U.S.C. § 5814(d). The proposal contemplated here would greatly expand § 2183 to non-nuclear energy patents.

13. 42 U.S.C. § 1857h-6.

14. The Patent Policies Affecting ERDA Energy Programs 250; Confidential telephone conversation with ERDA Office of General Counsel.

15. See generally, P. Sperber, supra; Public Comments on ERDA Proposed Regulations - Proposed Policies and Procedures, The Patent Policies Affecting ERDA Energy Programs, App. B.4.

16. The Patent Policies Affecting ERDA Energy Programs, App. B.4 at 33-35.

17. The Patent Policies Affecting ERDA Energy Programs, App. B.3 at 77-83.

APPENDIX

ORGANIZATIONAL CONFLICTS OF INTEREST

When DOE contracts to obtain advice, the advice it obtains should be objective, trustworthy, and not slanted to promote the aspirations of the advising firm. Moreover, no firm should be allowed to prepare specifications in such a manner that it is given an unfair advantage in later procurement contracting. In recently passed legislation to achieve these objectives, however, Congress may have dictated the result that a firm, which gives advice that results in a benefit to an entire industry by influencing general agency policy, may be barred from all follow-on work in the field. For this reason, the most active and knowledgeable firms in a field may refuse to agree to give preliminary advice to ERDA. RECOMMENDED: DOE's conflict of interest regulations must both promote the attainment of objective advice and avoid unfair advantages in contracting, without discouraging knowledgeable firms from agreeing to render their advice. The regulations must be made clear and permanent so that firms may assess accurately the risks of losing future contract opportunities.

Perhaps the most serious legal obstacle to greater private sector participation in DOE's RD&D planning process arises from the fact that the participating firms are private. For this reason, their individual private interests can never be identical with the public interest. It has therefore been deemed necessary for DOE to avoid those situations in which the purely private interests of a firm with which it is dealing conflict egregiously with the interests of the public.

The term "organizational conflict of interest" refers to the situation where a firm, which has dealings with the federal government, also has other interests—either to its other activities or its relationships with other organizations—which place it in an unsatisfactory or unfavorable position either:

- ° From the Government's standpoint in being able to secure impartial, technically sound, objective assistance and advice, or in securing the advantages of adequate competition; or
- ° From industry's standpoint in that an unfair competitive advantage may accrue to the firm in question.[1]

The problem of organizational conflicts of interest in government contracting is not a new one. It has been debated sporadically in Congress over the past 15 years. The House Committee on Government Operations initiated inquiries into these conflicts in 1959, and these inquiries were continued in 1961. In 1962, President Kennedy appointed a committee, headed by Budget Director David E. Bell, to study the problem. The "Bell Report" recommended that each agency develop regulations to govern conflicts of interests.[2] In 1963, a House Committee conducted an investigation which has influenced the focus of subsequent regulations governing organizational conflicts of interest. The investigation involved a firm which had been given a contract to prepare specifications for a project and then was permitted to compete for the resulting procurement contract.[3]

An objection can legitimately be raised to any situation which offers a private party the opportunity to draft or affect government contract specifications in a manner which would favor it in later procurement bidding. Obviously, a firm which can affect the preparation of specifications has an unfair competitive advantage in later bidding on actual projects. Prevention of such unfair competitive advantages has, therefore, been a major thrust of the various federal regulations governing organizational conflicts of interest. These regulations were adopted early by the Defense Department, the National Aeronautics and Space Administration and the former Atomic Energy Commission.

A second goal of regulations dealing with conflicts of interest is to ensure that the government obtains unbiased and reliable advice from those with which it deals. However, in practice, the only type of bias upon which federal agency attention has focused has been that which had a potential for unfair competitive advantage. These situations have primarily involved "follow-on" contracts, which are envisioned to be open for bid as a consequence of planning activities. Thus, for example, if a firm is deemed to be a "sole source" contractor in a particular project, the fact that the firm participated in planning the project generally is regarded as irrelevant since, by definition, no competitor will be adversely affected by this arrangement.[4] Those who undertake general feasibility studies which do not involve the preparation of specifications are not prevented by present regulations from bidding on the ultimate product.[5] Existing regulations can be criticized, however, for overlooking the fact that the mere possibility of a future contract may produce a favorable feasibility study, with conclusions flavored by prospects of that contract.

The practical importance of these regulatory loopholes was recently revealed in the "Bechtel Hearings" before the Subcommittee on Energy Research and Water Resources of the Senate Interior Committee. As a result of these hearings, Senator Abourezk (D. S.D.) concluded that a conflict of interest had existed in the Bechtel contract, but that it had gone unrecognized for several reasons:

- There was no requirement that conflicts of interest be disclosed to ERDA's contracting officials in the bidding process.
- This was not a contract where a follow-on procurement was envisioned.
- It was a sole source contract.[6]

Thus, since the regulations had been aimed primarily at follow-on situations which pose threats of unfair competitive advantages, the Bechtel contract was not one which was likely to raise questions of organizational conflicts of interest.

The Bechtel Hearings caused Senator Abourezk to sponsor legislation which would address conflict of interest situations. At the same time, ERDA began work on changes in its procurement regulations. Other bodies also began work on regulations which were to be applicable to all federal agencies.

The ERDA efforts resulted in the promulgation of ERDA-PR Temporary Regulation 35. This regulation includes a disclosure provision which pertains to all "evaluation and technical consulting and management support services."[7] It attempts to rectify the fact that ERDA was not formally receiving information as to possible sources of conflicts of interest among those with whom it dealt. In the case of the AEC, from which ERDA adopted its regulations, such formal channels of information might not have been necessary, due to the small number of firms involved in the field. DOE, in contrast, is less able to rely on informal channels of communication. Therefore, Temporary Regulation 35 requires offerors to provide information on potential conflicts of interest.[8] The regulation requires the inclusion of a contractual prohibition of certain follow-on work in contract for certain types of tasks:

> If the Contractor performs technical consulting or management support services . . ., or similar work, under this contract, it shall be ineligible thereafter to participate in any capacity in Government contractual efforts (solicited or unsolicited) which stem directly from such work, and the Contractor agrees not to perform similar work for prospective offerors with respect to any such contractual efforts.[9]

Despite the existence of a predecessor to Temporary Regulation 35, Congress chose to enact additional legislation governing organizational conflicts of interest in DOE contracting. This effort was incorporated into PL 95-39, signed into law on June 3, 1977. Like Temporary Regulation 35, the major thrust of PL 95-39 is to provide information to agencies so that they may recognize potential conflicts of interest.[10] It instructs the Secretary to require any firm proposing to enter into a contract agreement, or other arrangement with DOE to provide the Secretary with all relevant information bearing on whether that firm has a possible conflict of interest with respect to:

- Being able to render impartial, technically sound, or objective assistance or advice in light of other interests or relationships with other persons; or
- Being given an unfair competitive advantage.[11]

The Act, however, gives officials considerable leeway in formulating methods of dealing with organizational conflicts of interest which would be revealed by an offeror:

> [I]f he determines that a conflict of interest exists and . . . cannot be avoided . . . the Administrator may enter into a contract, agreement, or arrangement, if he determines that it is in the best interests of the United States to do so and includes appropriate conditions in such contract, agreement, or arrangement to mitigate such conflict.[12]

Both Temporary Regulation 35 and P.L. 95-39 seem to apply and encompass any possible contractual arrangement designed to help DOE order its funding priorities. Among organizations which currently have contractual relationships with DOE, problems arise in the two provisions, which may tend to discourage further participation in efforts to help DOE set its RD&D priorities.

The major element common to Temporary Regulation 35 and P.L. 95-39 is a requirement that an offeror provide data so that potential conflict of interest may be determined. Both the legislative and executive branch appear to agree that this was a reasonable means of effectuating the policy ensuring that information provided by the private sector be accurate and reliable. Industry, however, has registered considerable disagreement with this view. One criticism is of the sweeping and undefined nature of the information required. For example, P.L. 95-39 requires the disclosure of "all relevant information bearing on whether that person has a possible conflict of interest . . . in light of other interests or relationships with other persons," while Temporary Regulation 35 requires the offeror to provide a statement which describes, in a concise manner, all relevant facts concerning any financial, contractual, organizational, or other interests relating to the work it is to perform, and bearing on whether the offeror has a possible conflict of interest with respect to:

- ° Being able to render impartial, technically sound, and objective assistance or advice; or
- ° Being given an unfair competitive advantage.

The language of P.L. 95-39 has been condemned as so vague that an offeror would find it nearly impossible to know the scope of information required. One commentator has stated that it is:

> both broad and lacking in precision. One anticipated consequence of this fact may well be (1) hyperactive criticism of contractor failures to have pre-disclosed subsequently identifiable conflicts that, with the benefit of hindsight, were "possibly" discernible in the pre-contract stage and (2) if sanctions are to be provided for by the implementing regulations, the unfair imposition of penalties for the nondisclosure of a "possible" conflict that should have been anticipated or perceived by the contractor when competing for the contract.[13]

These effects are multiplied by the fact that the scope of many RD&D planning activities will be uncertain at the time that disclosure would be required. It may, therefore, not always be possible to predict the conflicts of interest which may eventually arise.

Such informational requirements also may present nearly insurmountable problems to large corporations dealing with DOE. These corporations may have hundreds of contracts with various government agencies, and many divisions and product lines. It would certainly be difficult for such a firm to certify that no conflicts of interest exist. Any attempt to gather all the required information would be extremely time consuming and expensive.[14] Thus, the requirement may make it less likely that such a corporation will be willing to participate in RD&D planning activities. Planning studies, of course, tend to be relatively small in dollar amounts as compared to RD&D contracts themselves. Indeed, for a major corporation, the effort to gather this information may well exceed the potential profit to be realized from a planning contract. Thus, a corporation which is willing to gather the necessary information for an RD&D contract may be unwilling to do so in order to participate in RD&D planning.

Moreover, the exclusion of follow-on work for those types of contracts covered by Temporary Regulation 35 may deter the most qualified firms from entering into covered contracts.[15] Obviously, few firms will be enthusiastic about participating in planning activities where the result is to eliminate future RD&D work in that field. Most firms have little interest in "one shot" contracts, and much prefer to sustain continuing efforts or product lines. Moreover, prohibitions on follow-on contracts are most likely to deter initial advisory work by those firms having the most practical expertise in a field, since it is these firms which are most likely to be concerned that they will be cut off from subsequent work of a more substantive nature.

The regulations, as they existed some time prior to the promulgation of Temporary Regulation 35 avoided this result by narrowly defining the scope of prohibitions on follow-on work to those to be used in procurement.[16] General feasibility studies were not deemed to result in a prohibition in follow-on work. Temporary Regulation 35 is less explicit, however. It prohibits follow-on work which "stem[s] directly from" previous work. No guidance is given as to what work may be considered to "stem directly" from advisory planning participation. Without more explicit guidance some firms will certainly be unwilling to undertake advisory work for fear that a later sweeping interpretation of this phrase may cut them off from large areas of RD&D involvement.

In the final analysis, it must be recognized that there are two competing—and probably irreconcilable—policy factors at work, affecting any effort to involve the private sector in ERDA's RD&D planning. On the one hand, there can be little doubt that, when the government contracts to obtain advice, that advice should, to the maximum extent possible, be objective and trustworthy. It certainly should not be slanted to promote the aspirations of the advising firm. Nor is there any doubt that a firm should not be allowed to prepare specifications in such a manner that it is given an unfair advantage in later procurement contracting. If, however, these concepts are carried to extremes, so that giving advice, which results in benefiting an entire industry by influencing DOE policy, has the effect of the advising firm's being barred from follow-on work in an entire field, the firms most active and knowledgeable in the field will almost certainly refuse to contract to give such preliminary advice.

Temporary Regulation 35, therefore, it seems, is in need of further revision to take these two policy factors into account. Whatever balance is struck, the rules must be clear and permanent, since uncertainty as to the scope of later exclusions is perhaps the greatest deterrent to private sector participation in DOE's planning activities. Ambiguity as to the breach of conflict of interest prohibitions makes it impossible for firms to estimate accurately the tradeoffs involved in undertaking a present advisory role for DOE and risking the loss of future RD&D contract opportunities.

NOTES

1. 41 C.F.R. § 9-1.5405.

2. U.S. Bureau of the Budget, Report to the President of Government Contracting for Research and Development, S. Doc. No. 94, 87th Cong., 2d Sess. (1962).

3. House Comm. on Government Operations, Avoiding Conflicts of Interest in Defense Contracting and Employment, H.R. Rep. No. 917, 88th Cong.,1st Sess. (1963).

4. See, e.g., 41 C.F.R. § 9-1.5407(b).

5. See, e.g., 41 C.F.R. § 9-1.5407(c).

6. Statement of Sen. Abourezk before the Senate Committee on Banking, Housing and Urban Affairs 8-9 (May 19, 1977).

7. 41 C.F.R. § 9-1.5406(d). Earlier in the Regulation, those terms were defined:

> (b) The term "evaluation services" means any work or effort involving the independent study of a particular technology, process, or product which entails the assessment, appraisal, or survey of such technology, process, or product.
>
> (c) The term "technical consulting and management support services" means any work or effort to provide internal assistance to any ERDA program division or other organizational component in the formulation or administration of its programs or projects, which normally necessitates that the contractor be given access to internal ERDA information. Such services typically include assistance in the preparation of program plans; evaluation, monitoring

> or review of contractors' activities or proposals submitted by prospective contractors; preparation of preliminary designs, specifications, or statements of work; the making of recommendations, or the rendering of an opinion or advice regarding any technical problem, issue, or question.

41 C.F.R. § 9-1.5405. It therefore seems likely that any formal agreement to participate in joint planning of DOE's RD&D activities is subject to the Regulation.

8. 41 C.F.R. § 9-1.5406(d).

9. 41 C.F.R. § 7.5006-40. The prohibition provision adds:

> The term "technical consulting and management support service" means any work or effort to provide internal assistance to any ERDA program division or other organizational component in the formulation or administration of its programs or projects which normally necessitates that the contractor be given access to internal ERDA information. Such services typically include assistance in the preparation of program plans, evaluation, monitoring or review of contractors' activities or proposals submitted by prospective contractors; preparation of preliminary designs, specifications, or statements of work; the making of recommendations, or the rendering of an opinion or advice regarding any technical problem, issue, or question.

10. Telephone interview with Chuck Ludlam, Counsel to Sen. Abourezk (D. S.D.).

11. P.L. 95-39, § 401 (amending 42 U.S.C. § 4901).

12. P.L. 95-39, § 401.

13. Crowell, "The Organizational Conflict of Interest—What is it and Why is it? What Should be Considered an Unfair Competitive Advantage?" presented at the ABA National Institutes, at 16-17 (1977).

14. Confidential interview with an executive of a major aerospace firm currently holding a number of DOE contracts.

15. Crowell, *supra* note 13, at 19-20. This view was expressed in a conversation with Roger D. Spencer, Director of Government and External Affairs, Glass Division, P.P.G. Industries. A staff member of the

Office of the General Counsel, ERDA, confirmed that a number of large firms have expressed concern about the loss of follow-on work and that for this reason such firms may be unwilling to engage in small preliminary contracts.

16. 41 C.F.R. § 9-1.5407(c). *See also* *Hayes International Corp. v. McLucas*, 509 F.2d 547 (5th Cir. 1975).

APPENDIX

THE IMPACT OF ANTITRUST CONSIDERATIONS

The range of potentially anticompetitive activities that could take place in the context of the joint planning of DOE RD&D makes it impossible to guarantee that industry participation will not result in, at least, allegations of an antitrust violation. Despite the difficulties of proving an antitrust violation, the cost of such litigation itself and the vagaries of the federal judiciary, with the threat of treble damages as a consequence, persuades many in the private sector to take a conservative stance to such joint RD&D planning. RECOMMENDED: In the event that it is determined that individual planning sessions with each representative of a particular industry are not practicable, an anticompetitive review process for joint RD&D sessions may afford some protection to participants and open lines of communication.

The threat of antitrust liability is frequently cited as a deterrent to participation by private industry in the planning of DOE sponsored RD&D programs.[1] Careful examination of the antitrust laws themselves,[2] as they apply to the joint planning situation, does not, however, produce a satisfactory explanation of the reluctance of certain firms to "sit down in one room" with representatives of their competitors and discuss their common business affairs.

Section 1 of the Sherman Act proscribes, "[e]very contract, combination . . . or conspiracy, in restraint of trade or commerce among the several States, or with foreign nations. . . ."[3] Section 2 of that Act is the anti-monopoly section.[4] Section 73 of the Wilson Tariff Act, enacted four years after the Sherman Act, is virtually identical to section 1 of that Act, except that one of the parties to the forbidden conspiracy must be engaged, as agent or principal, in importing goods into the United States.[5]

The draftsmen of the Sherman Act prohibitions intended a broad sweep to the Act. The construction of the terms "restraint of trade" and "monopolization" was left to the courts. The federal judiciary's and executive's predominant inclination toward laissez-faire economics in the late 19th and early 20th centuries, however, gave rise to pressure for a more specific statute. The result was the Clayton Act, enacted in 1914, which prohibited specific, discriminatory trade practices that "may have an anticompetitive effect." In an attempt to overcome government reluctance to enforce the antitrust laws, the Congress also greatly enlarged, in § 4 of the Clayton Act, the rights of a private party to sue for damages resulting from violations of the antitrust laws. The Act provides private parties with the right to recover treble damages plus the costs of suit, including a reasonable attorney's fee.[6]

Concern for the plight of the small businessman amidst the ravages of the Depression years led to the enactment of the Robinson-Patman Act in 1936. This Act, amending section 2 of the Clayton Act, was intended to increase the protection of small retailers against price discrimination presented by large multi-unit, "chain store" operators.

The Federal Trade Commission Act, which was passed in 1914, was enacted for much the same reason as the Clayton Act: the feeling that the Sherman Act was inadequate to deal with specific trade practices. However, unlike the Clayton Act, the Federal Trade Commission Act was even broader in scope than the Sherman Act. Section 5 prohibited "unfair methods of competition in commerce."[7] The Wheeler-Lea amendments, added in 1938, broadened section 5 to include a prohibition against unfair or deceptive acts or practices in commerce."[8] As a further impetus to curing trade abuses, the initial adjudication of the legality of such abuses was left, not to the courts, but to the newly created Federal Trade Commission. The Commission was given the power to issue injunctions in the form of cease and desist orders. Violation of cease and desist orders was made punishable by civil penalties. No provision was made, however, for a private cause of action, similar to that created by the Clayton Act, under the Federal Trade Commission Act.

Assuming that industry representatives assisting DOE in joint planning efforts do not intend to violate the antitrust laws, the threshold issue here becomes whether joint RD&D planning discussions themselves can violate the antitrust laws. The Clayton Act and the Robinson-Patman Act appear to be of minimal relevance to this issue. Those Acts require, as jurisdictional elements, actual sales or acquisitions. Thus, any agreement reached at a joint planning session to recommend certain RD&D activities would be of little importance in ascertaining whether one of these Acts had been violated, compared to the circumstances actually surrounding the sale or acquisition. This is not to say that the fact of a joint planning session is utterly irrelevant to an alleged Clayton Act or Robinson-Patman Act violation. Rather, the point here is that other facts will be far more important to any effort to substantiate such allegations.

Overt acts are also required to prove monopolization or an attempt to monopolize under § 2 of the Sherman Act.[9] The prohibitions, in § 1, of a conspiracy to restrain trade and, in § 2, of a conspiracy to monopolize do not, however, require any overt act other than the act of conspiracy.[10] Consequently, an industry representative attending a joint planning session, with no intent to engage his corporation in any later overt acts arising out of the discussion, can still be charged with a violation of the conspiracy prohibitions of §§ 1 or 2 of the Sherman Act. Thus, a violation of §§ 1 or 2 is a theoretically possible result of a firm's participation in a DOE RD&D planning session.

Section 1 of the Sherman Act forbids conspiracies "in restraint of trade," a phrase that is obviously impossible to define precisely. In the early cases, the courts looked to the common law concept of restraint of trade for guidance and soon arrived at the conclusion that the statute prohibited only "unreasonable" restraints of trade.[11] As later explained by Justice Brandeis in Chicago Board of Trade v. United States:[12]

> Every agreement concerning trade, every regulation of trade, restrains. To bind, to restrain, is of their very essence. The true test of legality is whether the restraint imposed is such as merely regulates and perhaps thereby promotes competition or whether it is such as may suppress or even destroy competition.[13]

The courts have unfortunately been able to add little else to the concept of restraint of trade over the years. Consequently, every imaginable restraint on economic activity, upon a finding that it is unreasonable, is a potential violation of section 1. The types of restraints that have been the subject of litigation thus far may, however, be categorized into certain broad groups:

- ° Price-fixing,
- ° Distribution practices,
- ° Boycotts, and
- ° Horizontal division of markets and
- ° Vertical division of markets.[14]

APPENDIX

Although competitors at a joint RD&D planning session could reach a prohibited agreement as to existing products or markets where the agreement is ancillary or even irrelevant to the issues raised by DOE, that situation needs little reference here. A DOE planning session is neither the only, nor the best, vehicle for reaching such agreements if industry members desire them. Since DOE is primarily interested in research, development and demonstration of new products and processes, it should be assumed that the potential restraints would arise in that area.

Perhaps the most celebrated instance of an alleged restraint of trade involving R&D is United States v. Automobile Manufacturers Ass'n.[15] There, the four major automobile manufacturers and their trade association were charged with violating § 1 by conspiring to eliminate competition in the research, development, manufacture and installation of motor vehcile air pollution control equipment, and in the purchase from others of patents and patent rights covering such equipment. The defendants had entered into a joint venture agreement as a combined effort to develop pollution control devices. The agreement contained restrictive cross-licensing provisions for any patents obtained. The case was ultimately settled by a consent decree and thus the issues were never adjudicated.

Although the case is often cited as evidence of the potential for antitrust liability in joint R&D ventures, it must be kept in perspective. The defendants were not charged with violating § 1 by entering into the agreement to engage in joint research. The crux of the charge was the alleged agreement by the defendants to delay the implementation of pollution control devices. It must further be recognized that even that agreement is not obviously a restraint of trade. This point was recognized in the later opinion by the court approving the consent decree and dismissing petitions for intervention filed by parties seeking to assert treble damage claims. The court noted:

> Those objecting have all assumed that the Government would win the action if it were brought to trial. But the Government's case is based upon a novel and unadjudicated theory. Knowledgeable people disagree as to the final result.[16]

The point here is that it is quite difficult to prove that an agreement relating to a product or process which is not yet developed, and the market potential of which may be nil, somehow restrains trade. These difficulties are compounded in the situation presented by an agreement arrived at in a joint planning session which would likely be informal and would have none of the formal trappings of the written joint venture agreement signed by all the parties in the Automakers case.

Nevertheless, the difficulties of proving an antitrust violation do not mean that no antitrust problems exist. Certainly such problems may be posed even if the informal agreements reached in a DOE-sponsored planning session are unlikely to be held in restraint of trade. These problems may derive from the possibility that the Justice Department or a third party may decide to argue that a violation has arisen out of a planning session, and to file a complaint against its participants. The potentially disastrous impact of antitrust litigation on any corporation is enough to persuade corporate counsel to adopt a conservative stance.[17] The time and costs involved in defending an antitrust suit, even disregarding the possibility of a treble damage recovery, are frequently staggering.

A second source of antitrust problems for joint planning participants is derived from the concept of "conscious parallelism." Parallel business activity by competitors, which is, in any way, related to matters discussed at a joint planning session may arguably be circumstantial evidence sufficient to sustain a jury finding of conspiracy. This concept was recognized by the Supreme Court in 1939.[18] Although the Court in later cases had made clear that the conscious parallelism concept has not read conspiracy out of the Sherman Act entirely,[19] it nevertheless constitutes another area where the mere presence of competitors at a joint meeting can be later linked to seemingly innocent, independent business activity to form the basis for an antitrust complaint. Indeed, even though no agreement is reached at a joint planning session, the mere presence of industry representatives at a meeting can support an allegation that some agreement was reached if later market developments suggest a violation. The lure of treble damages has undoubtedly given rise to complaints based on a great deal less.

The possibility of prosecution under the Federal Trade Commission Act is even greater. Section 5 of that Act forbids "unfair" methods of competition. The Clayton Act standard of liability—that an act "may be to substantially lessen competition or tend to create a monopoly"—was enacted to prohibit practices which might not amount to actual restraints of trade, so that they could be arrested in their incipiency. This was considered to be an improvement over the Sherman Act standard. However, the Federal Trade Commission, with its broad investigative powers, is not required to fulfill even the Clayton Act standard.[20] The standards for an FTC Act § 5 case are even more nebulous than the Sherman Act, and liability is simply decided on a case-by-case basis. Although the courts are the final arbiters of liability, great weight is usually given to Commission findings.

Finally, it may be argued that those parts of the private sector in which antitrust concerns are most deeply felt are frequently those which are already engaged in practices that may be questioned under the antitrust laws. These firms may well be reluctant to participate in any further activities which can spotlight their questionable practices, simply out of fear of litigation over them. Thus, cooperation with competitors in DOE planning can be thought to raise the inference of cooperation in other contexts. There are certainly some firms, industries and trade associations which would feel more comfortable if such inferences were neither drawn nor examined.

The risks inherent in making decisions regarding the antitrust laws are magnified by the often inconsistent and vague decisions rendered by the federal courts. The economic and political philosophies of the individual judges seem at least as important to understanding those decisions as is legal precedent.[21] Moreover, the practical reality of antitrust litigation is that it is extremely difficult to find an impartial jury where the defendant is a large oil company, or worse, a group of large oil companies.

The number of possible scenarios that could take place at, after, or in conjunction with a joint planning session makes it impossible to guarantee, given the possible consequences, that it is safe for industry representatives to meet and plan

RD&D programs. Indeed, a number of bills pending in Congress would require DOE to investigate any possible anticompetitive effects resulting from the award of a contract—including, presumably, one designed to steer RD&D efforts.[22] Increases in market concentration, decisions in competition and creation of market entry barriers are among the effects to be reviewed. Although the concept of such an antitrust review prior to the award of a contract may prove to be sound and workable, it has seemingly little relevance to joint planning sessions. Once a contract to engage in RD&D work is awarded. any anticompetitive effects arguably resulting therefrom are capable of some degree of analysis. In evaluating agreements to engage in RD&D planning, however, anticompetitive review would be far more hypothetical, since it would not be clear what the results of the planning session would be. In a sense, the anticompetitive review would be undertaken simply to determine who should be present at the planning session. It would seemingly be too early in the process to determine with any degree of accuracy what the anticompetitive effects might ultimately be.

Three possible alternatives seem to exist to avoid the antitrust problems of joint RD&D planning. The first is to have an attorney from the Antitrust Division of the Justice Department present at all meetings. The second is to hold only public hearings. The third is to meet with industry representative only individually. Of these, only the last seems to be certain of avoiding antitrust problems entirely. However, this result is achieved at the cost of eliminating the interaction and debate which an advisory board might provide.

APPENDIX

NOTES

1. Telephone interviews with Francis McCormick of the General Counsel's office at Atlantic Richfield Corp. and Joseph Russo of the General Counsel's office at the American Petroleum Institute.

2. The term "antitrust laws" is used to indlude: the *Sherman Act*, 15 *U.S.C.* § 1 *et seq.*; the *Clayton Act*, 15 *U.S.C.* § 12 *et seq.*; as amended by the *Robinson-Patman Act*, 15 *U.S.C.* §§ 13, 13a, 13b, 21a; the *Wilson Tariff Act*, 15 *U.S.C.* §§ 8, 9; and the *Federal Trade Commission Act*, 15 *U.S.C.* § 41 *et seq.*

3. 15 *U.S.C.* § 1.

4. 15 *U.S.C.* § 2.

5. 15 *U.S.C.* § 8.

6. 15 *U.S.C.* § 15.

7. 15 *U.S.C.* § 45(a)(1).

8. *Id.*

9. *See* J. Von Kalinowski, *Antitrust Laws & Trade Regulation* § 9.01(2)(b) (Business Organization Series, vol. 16A 1975).

10. *United States v. Socony-Vacuum Oil Co.*, 310 U.S. 150 (1940).

11. *Standard Oil Co. v. United States*, 221 U.S. 1 (1911).

12. 246 U.S. 231 (1918).

13. *Id.* at 238.

14. *See* *Von Kalinowski, Antitrust Laws & Trade Regulation* § 6.02(2) (Business Organization Series, vol. 16, 1975).

15. CCH Trade Cases ¶ 72,907 (C.D. Cal. 1969).

16. *United States v. Automobile Manufacturers' Ass'n*, 307 F. Supp. 617, 621 (C.D. Cal. 1969), *aff'd per curiam sub. nom.* *City of New York v. United States*, 397 U.S. 248 (1970).

APPENDIX

17. Telephone interviews with Francis McCormick of the General Counsel's office at Atlantic Richfield Corp. and Joseph Russo of the General Counsel's office at the American Petroleum Institute.

18. Interstate Circuit, Inc. v. United States, 306 U.S. 208 (1939).

19. Theatre Enterprises, Inc. v. Paramount Film Distributing Corp., 346 U.S. 537, 541 (1954).

20. Federal Trade Commission v. Brown Shoe Co., 384 U.S. 316 (1966).

21. See Handler, "The Inevitability of Risk-Taking," 44 Antitrust L.J. 377, 418 (1975).

22. See, e.g., S. 2845, H.R. 11380 (95th Cong., 1st Sess.).

CONCLUSION

Part of the problem the private sector has had in interacting with the DOE is caused by the policy changes which are inherent in the political process. To a certain extent, these changes are magnified by the lack of adequate private sector participation in DOE's RD&D programs. Obviously, policies which do not represent the consensus of those who are affected by RD&D programs are more subject to modification by executive order or legislative mandate than those which do reflect such a consensus. To be sure, there is no reason to expect that a consensus in every aspect of energy RD&D can be achieved when there is clearly no national agreement on an overall energy strategy. However, it seems certain that such a consensus will not be achieved as long as the private sector is inadequately involved in the planning of DOE's RD&D activities.

Characteristic of the problem of policy instability is the fact that Congress has occasionally intervened directly into the energy RD&D field in order to establish new priorities for it. A frequently mentioned example is the Electric & Hybrid Vehicle Research, Development & Demonstration Act of 1976.[1] However, Congress has also been the source of other policy changes, particularly in response to the nation's environmental concerns, which impact dramatically on energy technology implementation.

As may be expected, it is widely believed that DOE's RD&D program has been characterized by sporadic, unpredictable policy changes, alterations and outright reversals. As a result, there is fear that any product—however large and important—is subject to cancellation or delay at any time by

Senator WEICKER. Dr. Gibbons.

STATEMENT OF DR. JOHN H. GIBBONS, DIRECTOR, OFFICE OF TECHNOLOGY ASSESSMENT, U.S. CONGRESS, ACCOMPANIED BY DR. RICHARD ROWBERG, ENERGY PROGRAM MANAGER, OFFICE OF TECHNOLOGY ASSESSMENT

Dr. GIBBONS. Thank you, Mr. Chairman. I also would like to submit my statement for the record, and I would like to volunteer a summary of a report that we are just releasing in a couple of days for the record. That report has to do with energy efficiency in buildings and cities.

Mr. Chairman, I have six observations briefly this morning which in effect summarize my testimony. First of all, it is clear that the trend of energy required to produce our gross national product is dropping, dropping rather remarkably in the past decade, but as we analyze that drop with all its important benefits to the Nation, we should bear in mind that there are two ways in which that ratio can drop.

The first way is simply to use less in what we do. That comes about through recessions or through lowered thermostats in the winter and the like. These should be considered temporary and heroic measures, not long-term solutions to our problems.

The second important way to drop that ratio is to substitute our ingenuity and our capital for energy consumption through increased efficiency. We must be very careful in separating those two effects when we measure our progress.

The second point is that it is clear that there is an enormous potential for increased efficiency in our buildings. The potential savings by the turn of the century annually is about seven quads. Seven is a simple number. It translates to 3½ million barrels of oil per day, or more than 100,000 megawatt power plants running for year. It is an enormous amount of energy.

The result of our analysis shows that for half the cost it would take to produce that kind of energy, you can save it in the building sector between now and the end of the century.

The third point is that existing market forces will ultimately induce a substantial portion of this potential response. Perhaps three of the seven quads will come about through market forces. For at least 7 years, OTA has pointed out the importance of pricing goods and services at their real cost, but we have found in our work that price alone is necessary but not sufficient to achieve the sort of opportunities in this area of efficiency in buildings.

In our survey of over 100 owners of multifamily and commercial buildings, there are certain categories which have or will retrofit their buildings given the present situation in the market, and these generally are institutional owners, and moderate to upper income owners.

At the same time, despite these activities and some innovative programs that have been sponsored by local government and business, there exist sizeable gaps in the ability of markets, that is, energy prices, to stimulate investment in increased energy efficiency. The gap, Mr. Chairman, accounts for about 60 percent of the overall potential savings. Most buildings are owned by individuals and small partnerships. These people are limited in two ways. One is their access to long-term, low-cost capital, and the other is the uncertainty or risk that energy savings won't turn out to be what they think they might be. In taking into account these uncertainties, one finds that actions are generally taken that will pay back within 1 to 3 years at the most, rather than longer term and important actions that could be taken.

Therefore, the lack of dependable information on which these decisions can be made ranks along with the lack of availability of reasonable cost, long-term capital.

Other categories besides individuals and small partnerships where investments aren't like to occur without some changes include owners of tenant metered multifamily buildings, buildings with net or passthrough leases, schools and municipal buildings, houses owned by low-income people, and low rent multifamily buildings.

The fifth point, Mr. Chairman, is that the Federal Government programs that have been administered directly and through the States have already had a substantial impact on some of the owners that I have just mentioned a moment ago. These programs include the low-income weatherization programs which were the subject of discussion before this panel. I would point out to you, Mr. Chairman, that there is a difference between sensible retrofit programs which typically do cost a thousand dollars or more, and the so-called low- cost, no-cost programs which provide only very temporary relief.

We believe, Mr. Chairman, that the activities of this weatherization program could be doubled over several years up to a rate of 60,000 homes per month, a rate which would weatherize over the coming decade more than half of the estimated 12 million poorly weatherized low-income homes at a budget that would be no more than 20 to 25 percent of the low-income assistance budget that is on the book.

Another area, schools and hospitals——

Senator **Weicker**. I am going to have to ask you, only because I have got to bring this meeting to a close and we have one more witness——

Mr. **Gibbons**. One more minute and I am finished—in schools and hospitals we can describe our progress, but another way to describe it is that 85 percent of schools and 75 percent of hospitals haven't had a chance to be assisted even by an energy audit at this point.

My last point is that there exist several choices for the Federal Government in stimulating investment in energy efficiency of buildings. The most obvious one is economic policy that enables lower interest rates and longer term capital to be available to investors.

Another is that in the face of continued national need for this higher efficiency, Congress might consider making available temporary subsidies for energy efficiency investment loans, for instance, the solar and conservation bank, and third, to support programs which would lower this perceived risk of investment, and that implies careful efforts to design, develop, and verify these audit and retrofit methods.

Mr. Chairman, thank you.

Senator WEICKER. Thank you very much, Dr. Gibbons.

[The prepared statement and additional material submitted by Dr. Gibbons follow. Testimony continues on p. 528.]

TESTIMONY OF JOHN H. GIBBONS
DIRECTOR, OFFICE OF TECHNOLOGY ASSESSMENT
BEFORE THE SUBCOMMITTEE ON CONSERVATION AND SUPPLY
SENATE COMMITTEE ON ENERGY AND
NATURAL RESOURCES
ENERGY BUDGET OVERSIGHT HEARINGS
MARCH 30, 1982

THANK YOU FOR THE OPPORTUNITY TO TESTIFY ON THIS IMPORTANT SUBJECT. THE OFFICE OF TECHNOLOGY ASSESSMENT, AT THE REQUEST OF COMMITTEES OF THE CONGRESS, HAS COMPLETED AND PUBLISHED A NUMBER OF STUDIES IN ENERGY CONSERVATION TECHNOLOGIES. THIS TESTIMONY IS BASED ON THESE STUDIES AND IN PARTICULAR, ON ONE CALLED ENERGY EFFICIENCY OF BUILDINGS IN CITIES, WHICH WE EXPECT TO RELEASE ON APRIL 1, 1982 TO THE REQUESTING COMMITTEE, THE SUBCOMMITTEE ON HOUSING AND COMMUNITY DEVELOPMENT OF THE HOUSE COMMITTEE ON BANKING FINANCE AND URBAN AFFAIRS. WITH YOUR PERMISSION, WE WILL SUBMIT THE SUMMARY OF THAT REPORT FOR THE RECORD OF THIS HEARING. THE TESTIMONY ALSO DRAWS ON MY OWN EXPERIENCE -- BOTH IN AND OUT OF THE FEDERAL GOVERNMENT SINCE 1971 -- ON ENERGY CONSERVATION ISSUES.

I WANT TO ADDRESS TWO MAJOR QUESTIONS WHICH ARE CENTRAL TO CONSIDERATION OF THE APPROPRIATE SIZE OF THE BUDGET FOR FEDERAL ENERGY CONSERVATION PROGRAMS. THESE ARE: (1) HOW IMPORTANT IS INCREASED ENERGY EFFICIENCY TO THE NATION'S ECONOMIC HEALTH AND SECURITY? AND (2) HOW IMPORTANT IS AN ACTIVE FEDERAL ROLE IN BRINGING ABOUT INCREASED ENERGY EFFICIENCY? I WILL FOCUS ON BUILDING ENERGY EFFICIENCY SINCE MOST OF THE PROGRAMS UNDER DISCUSSION TODAY CONCERN THAT SECTOR.

WITH THESE TWO QUESTIONS IN MIND LET ME PROCEED TO SEVERAL MAJOR POINTS TO BEAR IN MIND IN CONSIDERING THE BUDGET OF THE DEPARTMENT OF ENERGY.

1. THERE HAS BEEN AND CONTINUES TO BE CONSIDERABLE MOVEMENT TOWARD USING LESS ENERGY PER UNIT OF GNP IN THIS COUNTRY. WE MUST BE CAREFUL, HOWEVER, TO DISTINGUISH BETWEEN THOSE ACTIONS THAT IMPROVE EFFICIENCY AND ARE LASTING, AND THOSE THAT REPRESENT CURTAILMENT AND ARE MORE TRANSITORY.

THE RATIO OF THE GROWTH IN ENERGY DEMAND TO GROWTH IN GNP HAS FALLEN, FROM 1.1 DURING THE DECADE OF THE 1960S (WHEN ENERGY DEMAND GREW FASTER THAN GNP) TO 0.4 IN THE DECADE OF THE 1970S WHEN ENERGY DEMAND GREW LESS THAN HALF AS FAST AS GNP. THE SLOWING OF THE GROWTH IN ENERGY DEMAND HAS HAD ESPECIALLY BENEFICIAL IMPACTS ON OUR OIL IMPORTS. WE ARE IMPORTING ONLY 13% OF OUR ENERGY NEEDS COMPARED TO 24% IN 1977. THIS REDUCTION REPRESENTS SAVINGS OF $40 TO $50 BILLION ANNUALLY WHICH NOW CAN BE USED PRODUCTIVELY IN THIS COUNTRY.

WHILE THIS IS AN IMPRESSIVE ACHIEVEMENT, IT IS IMPORTANT TO REMEMBER THAT DECREASES IN ENERGY USE RELATIVE TO GNP THAT ARE DUE TO IMPROVED EFFICIENCY OF ENERGY USE HAVE SEVERAL IMPORTANT ADVANTAGES OVER DECREASES IN ENERGY USE THAT ARE DUE ONLY TO CUTBACKS AND CURTAILMENTS IN ENERGY USE.

LET ME ILLUSTRATE THIS POINT WITH THE CASE OF A MULTI-FAMILY BUILDING. SUCH A BUILDING CAN SUSTAIN A 20% DECREASE IN ENERGY USE IN TWO DIFFERENT WAYS. (1) THE LANDLORD MAY ELECT TO SHUT OFF THE HEAT FROM 10 A.M. TO 5 P.M. WHILE MOST OF THE TENANTS ARE AWAY. THIS HAS BECOME AN INCREASINGLY COMMON RESPONSE TO ENERGY PRICE INCREASES AND IS A PROBABLE CONTRIBUTOR TO THE FACT THAT NEW YORK CITY HAD AN INCREASE IN HEATING COMPLAINTS FROM 225,000 IN 1978-79 TO 320,000 IN 1980-81. (2) ON THE OTHER HAND, THE LANDLORD MAY INVEST IN SUCH RETROFIT MEASURES AS A NEW HIGHER EFFICIENCY BURNER, DOUBLE GLAZING OR REPLACING INCANDESCENT LIGHT FIXTURES WITH FLUORESCENT.

Both reductions in energy use will contribute to a national decrease in energy use relative to GNP. In the second case however, there can be a permanent increase in the energy efficiency of the building which will make it use less energy for all future owners. This can come about with no loss in comfort to the current tenants. And it leaves the option of cutting back heat in response to any further sharp price increases. Investments in energy efficiency are a long-term response to our national energy situation which help bring about stability in energy prices and resilience to future energy disruptions.

2. The major part of an estimated seven Quads per year* of savings from increased energy efficiency in buildings can be achieved with investments with a simple payback of seven years or less. In our Energy Efficiency of Buildings in Cities assessment, we estimate that a total of about seven Quads of energy savings per year by 2000 is technically possible from investments in the energy efficiency of buildings that are feasible and that would payback within the lifetime of each retrofit. This is equivalent to about 3.5 million barrels per day or about two-thirds of all our oil imports in 1981.

We estimate that about half the savings would come from savings in fuel used to generate electricity. We recognize that just as there are difficult and costly ways to increase energy supply, so are there difficult and costly ways to decrease energy use. However, such costly investments are not necessary to significantly reduce energy use. We analyzed thirteen different building types with significantly different retrofit options. For each of

---

* A Quad stands for quadrillion Btus. Seven Quads is equivalent to 3.5 million barrels of oil per day for a year.

THEM THERE ARE A LARGE NUMBER OF EFFECTIVE, PROVEN RETROFITS WHICH CAN REDUCE ENERGY USE AND WHICH COST NO MORE THAN SEVEN TIMES THE VALUE OF THE FIRST YEAR'S ENERGY SAVINGS. THESE INVESTMENTS GIVE A RETURN OF 13% TO MORE THAN 50% PER YEAR AFTER INFLATION IS TAKEN INTO ACCOUNT. FOR MOST BUILDING TYPES ANALYZED, 70%-80% OF THE TOTAL POTENTIAL SAVINGS OF THAT BUILDING FALL IN THIS CATEGORY.

3. THERE IS NO DOUBT THAT MARKET FORCES WILL BRING ABOUT A SIGNIFICANT FRACTION OF THE POTENTIAL INVESTMENT IN ENERGY EFFICIENCY IDENTIFIED BY OTA. AS HAS BEEN POINTED OUT BY OTA FOR AT LEAST FOUR YEARS, PRICING OIL AND NATURAL GAS AT THEIR REPLACEMENT COSTS IS THE MOST IMPORTANT STEP IN IMPROVING THE MARKET INCENTIVE FOR BOTH CONSERVATION AND SUPPLY DEVELOPMENT. IN OUR ASSESSMENT WE ESTIMATED THAT ABOUT THREE QUADS OF ENERGY SAVINGS PER YEAR, OR 40% OF THE POTENTIAL, WOULD ULTIMATELY COME ABOUT FROM BUILDING OWNER INVESTMENTS UNDER CURRENT MARKET CONDITIONS.

FROM A SURVEY OF ALMOST ONE HUNDRED OWNERS OF MULTI-FAMILY AND COMMERCIAL BUILDINGS WE CONCLUDED THAT CERTAIN CATEGORIES OF OWNERS HAVE ALREADY OR DEFINITELY WILL RETROFIT THEIR BUILDINGS. THESE OWNER TYPES INCLUDE INSTITUTIONAL OWNERS SUCH AS INSURANCE COMPANIES OR PENSION FUNDS, CORPORATIONS WHICH OCCUPY THEIR BUILDINGS AND NATIONALLY SYNDICATED PARTNERSHIPS. OWNERS IN THESE CATEGORIES THAT WE INTERVIEWED HAD EXPLICIT POLICIES OF MAKING ENERGY EFFICIENCY INVESTMENTS AND SET EXPLICIT PAYBACK CRITERIA RANGING UP TO THREE TO SEVEN YEARS. MANY HAD ALREADY RETROFIT THEIR BUILDINGS. ALL OF THESE OWNER TYPES HAVE GOOD TO EXCELLENT ACCESS TO CAPITAL AND PROFESSIONAL PROPERTY MANAGEMENT ADVICE. ALL HAVE A LONG TERM INVESTMENT PERSPECTIVE ON THEIR BUILDINGS. AS THE HEAD OF A NATIONAL SYNDICATE'S PROPERTY MANAGEMENT DEPARTMENT EXPLAINED TO US, "THE SOPHISTICATED INVESTORS WE DEAL WITH WANT QUALITY IN THEIR PRODUCT NOT JUST [TAX] SHELTER."

We also estimated that moderate and upper-income owners of single-family buildings and owner-occupants of multi-family buildings and commercial buildings would invest in their buildings to a similar extent.

In response to these market opportunities, we found several private institutions engaged in stimulating and providing retrofit services. Private sector retrofit companies are very active in some parts of the country primarily serving upper-income homeowners and businesses who have good access to capital. Utilities in some regions have developed active building retrofit programs, on their own or in response to State directives, as an alternative to further construction of high-cost powerplants. Finally cities in some regions have launched public-private retrofit programs involving banks, utilities and some public funding.

4. Despite all the activity stimulated by the market or by some local programs which are independent of the Federal government, we found some sizable gaps in the ability of the market to stimulate investment in energy efficiency (as opposed to further curtailments). The combined impact of the gaps in market stimulus could cause up to four Quads of energy savings per year (about 60% of the potential) to be foregone because of failure to make investments in energy efficiency.

Buildings are by and large owned by individuals and small partnerships. For several reasons such owners are limiting any investments in energy efficiency to those which can be financed out of one, or two, years of projected energy savings. The most important of these reasons is lack of access to long-term capital at reasonable rates. Individuals and small partnership owners generally do not have access to capital. Such owners only have access to loans of short terms (less than two years) and high interest

RATES (TWO POINTS ABOVE PRIME). DEBT SERVICE ON LOANS FOR ANY RETROFIT WITH A PAYBACK LONGER THAN A SINGLE YEAR COULD CUT DEEPLY INTO A BUILDING'S CASH FLOW. MANY BUILDING OWNERS CANNOT AFFORD DEBT SERVICE THAT IS NOT DIRECTLY OFFSET BY ENERGY SAVINGS. AS ONE MULTI-FAMILY BUILDING OWNER IN BUFFALO TOLD US, "I WOULD NORMALLY WANT TO SPEND $5,000 IN ORDER TO SAVE $2000 [PER YEAR] BUT NOT WHEN I CAN'T AFFORD [DEBT] SERVICE ON THE $5,000."

IN ADDITION THERE IS A SUBSTANTIAL RISK FOR OWNERS OF INDIVIDUAL BUILDINGS THAT ENERGY SAVINGS WILL BE BELOW WHAT HAS BEEN PREDICTED. WHAT DATA EXISTS COMPARING ACTUAL ENERGY SAVINGS TO PREDICTED SAVINGS SHOWS A RANGE OF RESULTS FROM SAVINGS THAT ARE 50%-70% ABOVE PREDICTED TO 50%-70% BELOW PREDICTED. THERE IS THEREFORE A SUBSTANTIAL RISK THAT A RETROFIT PREDICTED TO HAVE A THREE YEAR PAYBACK COULD END UP WITH A SIX YEAR PAYBACK INSTEAD. UNDER SUCH CONDITIONS ENERGY SAVINGS WILL NOT NEARLY OFFSET DEBT SERVICE COSTS. ONE OF THE REASONS FOR SUCH POOR PREDICTABILITY OF ENERGY SAVINGS IS INADEQUATE DATA ON THE OUTCOME OF ACTUAL RETROFITS TO PARTICULAR TYPES OF BUILDINGS, ESPECIALLY DATA THAT TAKE INTO ACCOUNT SUCH IMPORTANT INFLUENCES ON ENERGY SAVINGS AS CLIMATE VARIATIONS FROM YEAR TO YEAR, OCCUPANCY CHANGES, OCCUPANT BEHAVIOR AND THE EFFECT OF PREVIOUS RETROFITS.

WE IDENTIFIED SEVERAL OTHER CATEGORIES OF BUILDINGS WHOSE OWNERS ARE UNLIKELY, GIVEN PRESENT INCENTIVES, TO MAKE INVESTMENTS IN IMPROVING THEIR ENERGY EFFICIENCY. OWNERS OF TENANT-METERED MULTI-FAMILY BUILDINGS HAVE LITTLE INCENTIVE TO MAKE THEIR BUILDINGS MORE ENERGY EFFICIENT. THERE IS LITTLE EVIDENCE THAT AN ENERGY EFFICIENT BUILDING CAN CHARGE HIGHER RENTS FOR SPACE THAT IS SIMILAR IN AMENITIES TO OTHER LESS ENERGY EFFICIENCY SPACE. THE SAME SEEMS TO BE TRUE FOR RETAIL BUILDINGS WITH NET OR PASS-THROUGH LEASES IN WHICH THE TENANTS PAY FOR MAINTENANCE AND UTILITIES. ONLY IN FAIRLY SOFT

MARKETS FOR OFFICE BUILDINGS DID BUILDING OWNERS TELL OTA THAT THEY WOULD EXPECT TENANTS SOON TO START LOOKING AT THE ESCALATOR CLAUSES AND THE TYPICAL UTILITY COSTS OF THE BUILDING AS WELL AS THE QUOTED RENT.

SCHOOLS AND MUNICIPAL BUILDINGS ARE ANOTHER CATEGORY OF BUILDINGS WHERE ENERGY INVESTMENTS ARE LIKELY TO BE MADE SLOWLY OR NOT AT ALL. SCHOOL BOARDS AND MUNICIPAL GOVERNMENTS SHARE WITH CORPORATIONS AND INSURANCE COMPANIES THE CHARACTERISTIC THAT THEY HAVE ANNUAL PLANNING AND BUDGET CYCLES AND PROFESSIONAL PROPERTY MANAGEMENT. UNLIKE THE CORPORATE OR LARGE INSTITUTIONAL OWNER, ON THE OTHER HAND, GOVERNMENT OWNERS OF BUILDINGS HAVE SEVERE CONSTRAINTS ON SUBSTITUTING CAPITAL FOR OPERATING EXPENSES DUE TO SEVERE PRESSURES ON ANNUAL BUDGETS (ESPECIALLY IN TIMES OF SUBSTANTIAL INFLATION). IN ADDITION, THERE ARE MANY LIMITS ON BOND MARKET ACCESS AND USE.

LOW INCOME OWNERS OF HOUSES HAVE VERY STRONG INCENTIVES TO CUT BACK ON ENERGY USE BUT FEW MEANS TO MAKE EFFECTIVE ENERGY INVESTMENTS. OTA ANALYSIS SHOWED THAT OWNERS OF LOW-RENT MULTI-FAMILY BUILDINGS WOULD BENEFIT MOST FROM ENERGY RETROFIT BECAUSE ENERGY IS SUCH A BIG FRACTION OF THEIR COST. OWNERS OF SUCH BUILDINGS, HOWEVER, FIND IT ESPECIALLY HARD TO OBTAIN CAPITAL TO INVEST.

AS FOR MEANS TO ADDRESS THESE PROBLEMS, WE FOUND THAT THE IMPACT OF PUBLIC PROGRAMS AND PRIVATE BUSINESSES ON THE WILLINGNESS OF BUILDING OWNERS TO RETROFIT IS LIKELY TO BE VERY UNEVEN. PRIVATE RETROFIT BUSINESSES ARE UNLIKELY TO HAVE A LARGE IMPACT ON BUILDING OWNERS WITHOUT ACCESS TO CAPITAL UNLESS THESE BUSINESSES CAN THEMSELVES TAP CAPITAL RESOURCES. WE IDENTIFIED ONLY ONE COMPANY THAT IS PUTTING UP THE CAPITAL ITSELF. THE POTENTIAL HAS BEEN IDENTIFIED, BUT NOT YET REALIZED, FOR THIRD-PARTY INVESTORS TO PUT UP THE CAPITAL.

MANY PRIVATE UTILITIES ARE CONSTRAINED BY THEIR PARTICULAR FINANCIAL CIRCUMSTANCES OR BY STATE REGULATORY PRACTICES FROM LAUNCHING ANYTHING BUT SMALL-SCALE AUDIT PROGRAMS TO IMPROVE CUSTOMER RELATIONS. CITIES IN MANY REGIONS FIND IT DIFFICULT TO FREE UP FINANCIAL AND MANAGERIAL RESOURCES FOR ENERGY RETROFIT PROGRAMS WHEN SO MANY OTHER PROBLEMS COMPETE FOR THE ATTENTION OF CITY OFFICIALS.

5. THE FEDERAL GOVERNMENT, THROUGH SEVERAL STATE-ADMINISTERED PROGRAMS AND A FEW NATIONALLY-ADMINISTERED ONES, HAS ALREADY HAD AN IMPACT ON SOME OF THE KIND OF BUILDING OWNERS WE IDENTIFIED AS UNLIKELY TO INVEST IN THEIR BUILDINGS' ENERGY EFFICIENCY. WE ASSESSED THE IMPACT OF THESE PROGRAMS THROUGH INTERVIEWS IN FIVE CASE STUDY CITIES AND THROUGH USE OF AVAILABLE PROGRAM EVALUATIONS. IN GENERAL PROGRAMS REQUIRED SOME IMPROVED MANAGEMENT BUT WERE STRUCTURED TO HAVE BENEFICIAL EFFECTS. LET ME MENTION THESE PROGRAMS BRIEFLY.

LOW-INCOME WEATHERIZATION. WE REACHED MUCH THE SAME CONCLUSIONS ABOUT THE WEATHERIZATION PROGRAM AS THOSE EXPRESSED IN THE RECENT GAO COMMENTS ON THE DOE BUDGET. THE 1981 WEATHERIZATION BUDGET WAS ONLY ABOUT ONE-TENTH AS BIG AS THE $1.8 BILLION SPENT FOR LOW INCOME ENERGY ASSISTANCE. BY LATE 1981, HOMES WERE BEING WEATHERIZED UNDER THE PROGRAM AT A RATE OF 30,000 PER MONTH. THE PROGRAM HAD IMPROVED ITS WORKMANSHIP AND QUALITY CONTROL AND HAD BEGUN TO REACH MORE RENTAL PROPERTIES. IT WAS VERY WELL ADMINISTERED IN SOME STATES. WE BELIEVE THAT THE ACTIVITY OF THE PROGRAM COULD BE DOUBLED OVER SEVERAL YEARS TO 60,000 HOMES PER MONTH, A RATE THAT WOULD WEATHERIZE OVER A DECADE MORE THAN HALF OF THE ESTIMATED 12 MILLION POORLY WEATHERIZED LOW-INCOME HOMES AT A COST NO MORE THAN 20 - 25% OF THE LOW INCOME ASSISTANCE BUDGET.

SCHOOLS AND HOSPITALS. THE $260 MILLION THAT HAS BEEN SPENT ON THIS PROGRAM SINCE 1979 HAS FUNDED AUDITS OF 60,000 BUILDINGS -- AN ESTIMATED 15% OF ALL ELIGIBLE SCHOOLS AND 25% OF ALL ELIGIBLE HOSPITALS. ABOUT 8,000 RETROFIT GRANTS HAVE BEEN APPROVED. STATES THAT HAVE SURVEYED THE RESULTS REPORT ON AVERAGE ENERGY SAVINGS OF 20% BY PARTICIPATING INSTITUTIONS. WE FOUND IN AT LEAST ONE CASE STUDY CITY THAT THE SCHOOLS AND HOSPITALS PROGRAM HAD HELPED DEVELOP AUDIT AND RETROFIT EXPERIENCE FOR LOCAL RETROFIT BUSINESSES. THIS IMPLIES THAT THE VALUE OF THE PROGRAM GOES BEYOND THE IMMEDIATE ENERGY SAVINGS IN THE AFFECTED BUILDINGS.

UTILITY AUDIT PROGRAMS. THE FEDERAL GOVERNMENT HAS BEEN A LEADER IN ENCOURAGING UTILITIES TO CONSIDER CONSERVATION PROGRAMS AS AN ALTERNATIVE TO CONSTRUCTION OF NEW POWERPLANTS AND AS A WAY TO ALLEVIATE CONSUMER HARDSHIP CAUSED BY INCREASES IN ENERGY PRICES. NATIONAL GUIDELINES HAVE HELPED CREATE A LARGE-SCALE AND RAPID IMPROVEMENT IN AUDIT TECHNIQUES, ESPECIALLY COMPUTERIZED ANALYSIS METHODS. WE SHARE GAO'S VIEW THAT WITHDRAWAL OF FEDERAL LEADERSHIP AND TECHNICAL ASSISTANCE WOULD LEAD TO VERY UNEVEN QUALITY IN BOTH RESIDENTIAL CONSERVATION PROGRAMS AND IN RETROFIT PROGRAMS FOR SMALL MULTI-FAMILY BUILDINGS AND COMMERCIAL BUILDINGS. UTILITY AUDIT PROGRAMS ARE A MAJOR PROVIDER OF RELIABLE, TRUSTWORTHY INFORMATION TO OWNERS INTERESTED IN INVESTING IN THE ENERGY EFFICIENCY OF THEIR BUILDINGS. THIS HELPS THE MARKET TO WORK MORE EFFECTIVELY.

OTHER FEDERAL IMPACTS. OTHER EXAMPLES OF EFFECTIVE PROGRAMS WE IDENTIFIED IN THE COURSE OF THIS ASSESSMENT INCLUDE THE FOLLOWING:

A. FUNDING OF THE DEVELOPMENT OF "HOUSE DOCTOR" TECHNIQUES IN PRINCETON AND ELSEWHERE, NOW BEING SUCCESSFULLY APPLIED IN A BLOCK-BY-BLOCK CAMPAIGN IN MINNEAPOLIS.

B. Improvement of information to building trade associations. DOE funded an energy conservation handbook for dessemination through BOMA (Building Owners and Manger's Association) and also funded demonstration retrofits of six hotel and motel types through the American Hotel and Motel Association.

C. Documentation of the results of actual retrofits by DOE staff and national laboratory staff. This was an important step towards eliminating the appalling lack of good data and analysis on the results of actual retrofits.

6. There are several choices for further Federal involvement in stimulating investment in energy efficiency. From the perspective of limiting the Federal role to one that complements efforts in the private sector, the obvious role for the Federal government is to develop an economic policy that will make it possible for longer-term financing to become available at lower interest rates. We believe this step can do as much as any other thing in accelerating investment in greater energy efficiency.

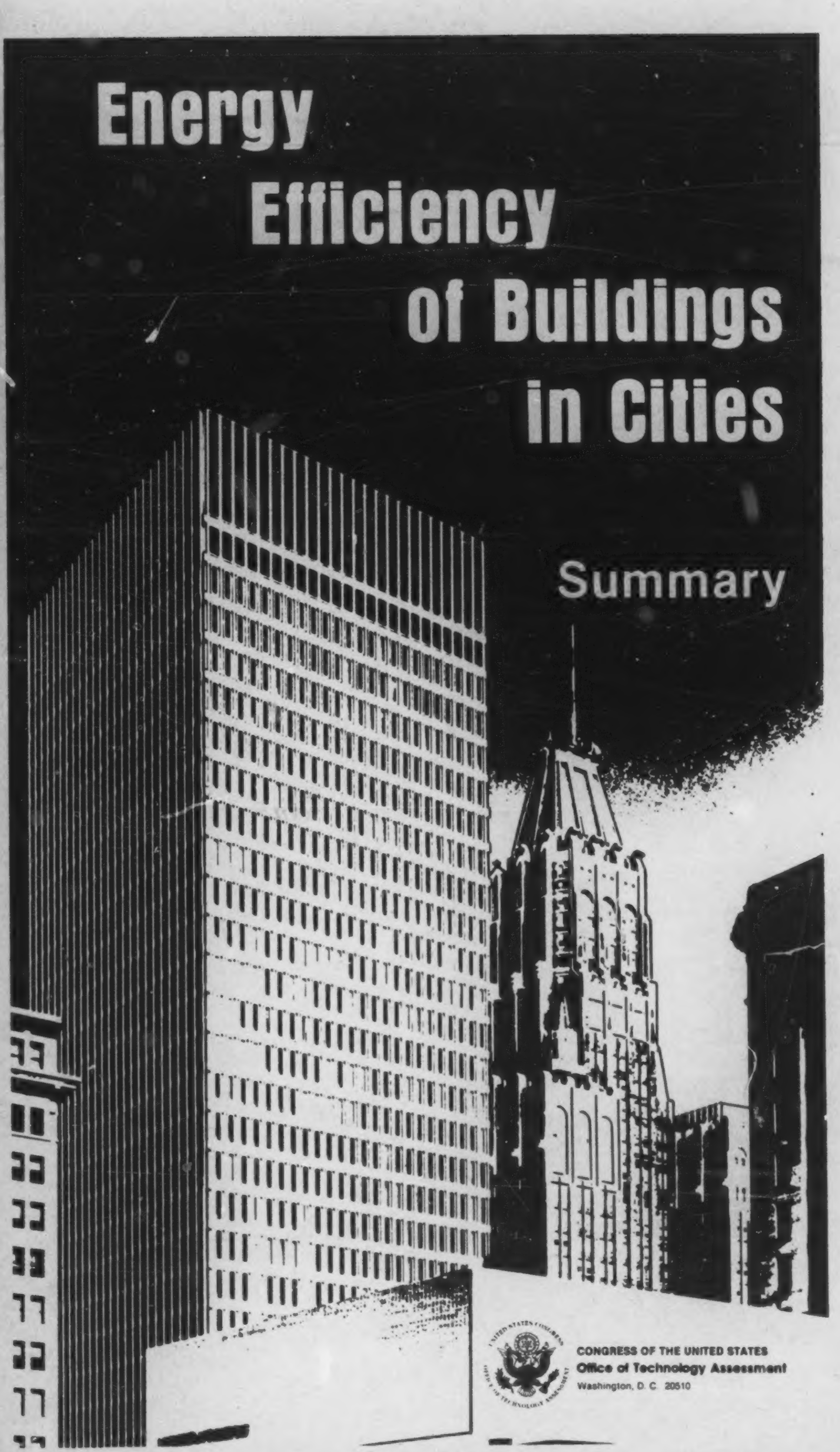
In view of continued national need for increased energy efficiency, Congress may also want to consider making available temporary subsidies for energy efficiency investment loans, through mechanisms such as the Solar and Conservation Bank, until interest rates came back down to some specified level.

In these times of budgetary constraint, an effective Federal role could also emphasize programs to lower the perceived risk of retrofit. One need is

FOR CAREFULLY-DESIGNED VERIFICATION OF AUDITING TECHNIQUES AND OF TECHNIQUES OF COMPUTERIZED ANALYSIS OF BUILDINGS BY COMPARING THEORETICAL RESULTS AGAINST ACTUAL RESULTS OF RETROFITS IN BUILDINGS. THIS DEMANDS A LEVEL OF DATA-GATHERING AND STATISTICAL TECHNIQUES THAT IS DIFFICULT FOR INSTITUTIONS OTHER THAN THE FEDERAL GOVERNMENT TO PROVIDE. A SECOND NEED IS FOR RELIABLE ON-SITE ENERGY AUDITS TO SMALLER BUILDING OWNERS, SUCH AS WOULD BE PROVIDED BY THE RESIDENTIAL CONSERVATION SERVICE AND ITS EXTENSION TO THE COMMERCIAL AND APARTMENT CONSERVATION SERVICE.

7. I HAVE ONE FINAL COMMENT. STABILITY IN GOVERNMENT POLICY TOWARDS ENERGY CONSERVATION IS JUST AS IMPORTANT IN STIMULATING THE FREE MARKET AS IT IS FOR ANY OTHER ASPECT OF GOVERNMENT ECONOMIC POLICY. AS HAS BEEN SAID MANY TIMES CONSISTENCY OF POLICIES AND PROGRAMS IS AT LEAST AS IMPORTANT AS THE SPECIFIC CONTENT OF THE POLICIES THEMSELVES. RAPID CHANGES IN ENERGY PROGRAMS MAY BE NECESSARY TO ACCOMMODATE CHANGES IN POLITICAL CONTEXT BUT THEIR COST SHOULD BE WELL UNDERSTOOD. BUSINESS MAKE INVESTMENTS LOOKING SEVERAL YEARS AHEAD. BUSINESSES AND GOVERNMENTS STAFF, TRAIN, AND MANAGE BASED ON ACCUMULATED EXPERIENCE FROM SUCCESSES AS WELL AS PROBLEMS. FOR THE WEATHERIZATION PROGRAM IN PARTICULAR, ANOTHER SHIFT FROM DOE BACK TO HHS MAY BE UNFORTUNATE. IN OUR INTERVIEWS IN THE FIVE CASE STUDY CITIES WE WERE TOLD OF THE CONFUSION CAUSED BY THE LAST SHIFT OF WEATHERIZATION -- FROM CSA TO DOE -- IN TRAINING, TECHNICAL ASSISTANCE AND EVEN THE MECHANICS OF CONTRACTING AND ACCOUNTING. TO CYCLE THE RESPONSIBILITY AGAIN WILL SURELY UNDERMINE THE PROGRAM'S EFFECTIVENESS.

THE TASK AT HAND -- TO RENOVATE OUR NATION'S STOCK OF BUILDINGS, SO THAT THEY ARE MATCHED TO THE NEW COST OF ENERGY, IS IMMENSE. WELL OVER A DECADE OF HARD SUSTAINED WORK AND A LARGE AMOUNT OF INVESTMENT IS REQUIRED. CONTINUITY OF POLICY IS ESSENTIAL ESPECIALLY BECAUSE MUCH TIME, EXPERTISE AND EFFORT IS REQUIRED. IT IS IMPORTANT TO SET SOUND POLICIES AND DEVELOP SOUND PROGRAMS AND THEN GIVE THEM SUFFICIENT TIME TO TAKE FULL EFFECT.



Energy Efficiency of Buildings in Cities

Summary

CONGRESS OF THE UNITED STATES
Office of Technology Assessment
Washington, D. C. 20510

Office of Technology Assessment

Congressional Board of the 97th Congress

TED STEVENS, *Alaska, Chairman*

MORRIS K. UDALL, *Arizona, Vice Chairman*

Senate

ORRIN G. HATCH
Utah

CHARLES McC. MATHIAS, JR.
Maryland

EDWARD M. KENNEDY
Massachusetts

ERNEST F. HOLLINGS
South Carolina

HOWARD W. CANNON
Nevada

House

GEORGE E. BROWN, JR.
California

JOHN D. DINGELL
Michigan

LARRY WINN, JR.
Kansas

CLARENCE E. MILLER
Ohio

COOPER EVANS
Iowa

JOHN H. GIBBONS
(Nonvoting)

Advisory Council

CHARLES N. KIMBALL, *Chairman*
Midwest Research Institute

EARL BEISTLINE
University of Alaska

CHARLES A. BOWSHER
General Accounting Office

CLAIRE T. DEDRICK
California Land Commission

JAMES C. FLETCHER
University of Pittsburgh

S. DAVID FREEMAN
Tennessee Valley Authority

GILBERT GUDE
Library of Congress

CARL N. HODGES
University of Arizona

RACHEL McCULLOCH
University of Wisconsin

WILLIAM J. PERRY
Hambrecht & Quist

DAVID S. POTTER
General Motors Corporation

LEWIS THOMAS
Memorial Sloan-Kettering
Cancer Center

Director

JOHN H. GIBBONS

The Technology Assessment Board approves the release of this report. The views expressed in this report are not necessarily those of the Board, OTA Advisory Council, or of individual members thereof.

Foreword

This summary presents the major findings of an assessment requested by the House Committee on Banking, Finance, and Urban Affairs for an evaluation of the impact on buildings found in cities, of energy price increases, and of Federal policies to encourage energy efficiency and the use of renewable energy in buildings. By focusing on multifamily and commercial buildings the report complements an earlier OTA study, *Residential Energy Conservation,* which analyzed the potential for improved energy efficiency of single-family houses.

In the assessment, OTA examines the potential for increased energy efficiency in buildings found in cities from two perspectives: that of the energy expert who assesses technical opportunities for improved energy efficiency, and that of the real estate expert who evaluates the financial attractiveness of real estate investment opportunities. OTA categorizes existing buildings according to their technical retrofit potential and also groups building owners according to the likelihood that they will invest in retrofits. The report assesses the prospects for large-scale stimulus of building retrofit by private businesses, public utilities, and city and State governments. Several options for Federal policies towards building retrofit are provided. The study also includes an analysis of the technical and economic feasibility of district heating in cities.

We are grateful for the assistance of the project advisory panel, as well as for the background work done by several contractors and the advice of numerous reviewers in State and local governments, universities, public interest groups, and business. It should be understood, however, that OTA assumes full responsibility for this report which does not necessarily represent the views of individual members of the advisory panel.

John H. Gibbons

JOHN H. GIBBONS
Director

Energy Efficiency of Buildings in Cities Advisory Panel

William Reilly, *Chairman*
Conservation Foundation

Francis Hooks Burr
Attorney
Ropes & Gray

Vernon Friason
Real Estate, F&H Services

Lenneal Henderson
Howard University

Michael Hogan
Utility Consultant

George Latimer
Mayor, City of St. Paul

Hewitt Lovelace
Public Safety Director

Neal R. Peirce
National Journal

George Peterson
The Urban Institute

John H. Robson
Marquette Fuels

Terry L. Sinnott
San Diego Gas & Electric

Victoria J. Tschinkel
Florida Department of
Environmental Regulation

James A. Walker
California Energy Resources
Conservation and Development
Commission

Joseph E. Widmayer
Complete Building Services, Inc.

OTA Energy Efficiency of Buildings in Cities Project Staff

Lionel S. Johns, *Assistant Director, OTA*
Energy, Materials, and International Security Division

Richard E. Rowberg, *Energy Program Manager*

Mary E. Procter, *Project Director*

Eric Bazques   Burton Goldberg*   Doreen McGirr*
Joanne Sedor   Nancy Naismith

Administrative Staff

Virginia Chick   Marian Grochowski   Lillian Quigg   Edna Saunders

Contractors and Consultants

Energyworks, Inc.
Steven Ferrey & Associates
Alan Meier
Real Estate Research Corp.
Jane Silverman
Temple, Barker & Sloane, Inc.
Frederick Winkelmann

OTA Publishing Staff

John C. Holmes, *Publishing Officer*

John Bergling   Kathie S. Boss   Debra M. Datcher   Joe Henson

---

*OTA contractor.

Energy Efficiency of Buildings in Cities

SUMMARY OF FINDINGS

Overview

This study is concerned with the prospects for and barriers to increased energy efficiency in the building stock of the Nation's cities. From the perspective of the energy specialist, the report assesses the specific capital investments that might be made to make existing buildings more energy efficient. Then from the perspective of the real estate specialist, the report identifies which of these investments in energy efficiency are likely to take place and which are not, and why.

Overall, OTA estimates that about 7 Quads* per year of energy savings is technically possible by 2000, through feasible** investments in the improved energy efficiency of building types covered in this report (see table 1). Nearly 3 Quads of these potential energy savings are likely to come about because of investments in energy efficiency made by building owners who have personal or business reasons to invest money in improved energy efficiency of their buildings.

The other 4 Quads of potential energy savings, on the other hand, may not occur because building owners fail to make investments in the energy efficiency of their buildings. Part of the failure to retrofit is due to the difficulty and costliness of improvements in energy efficiency to some building types. Part of the failure is due to building owners' stringent requirements for return on investments in energy efficiency. The diversity of buildings and owners and their implications for national energy use is described below.

---

*A Quad equals a quadrillion Btu of energy, a very large unit of energy. It is equivalent to about 500,000 barrels of oil per day for a year, or about 50 million tons of coal, or the output of 18 1,000-MW powerplants at average utilization. Seven Quads is equivalent to the energy of more than two-thirds of the oil the United States imported in 1981.

**Feasible investments are defined as those which in 1981 are technically feasible and which would be cost effective over a 20-year lifetime, assuming no real increases in energy prices and a 3-percent real return on investment.

BUILDING BY BUILDING RETROFIT POTENTIAL

Technical Description

The national potential (estimated in table 1) for increased energy efficiency of the building stock is the result of physical changes to improve the energy efficiency of millions of buildings. For convenience, these physical changes are referred to as *energy retrofits* in this report. While recognizing that each building is to some extent a unique problem, OTA did identify the major characteristics of buildings which influence the types of energy retrofits that are likely to be most effective. These are:

- **Size.**—Energy retrofits which improve the energy efficiency of the building envelope (walls, windows, and roof) are more important for small buildings than for large buildings. On the other hand, certain kinds of retrofits which bring about similar savings in small buildings and large buildings will cost relatively less per unit of energy saved in large buildings because of economies of scale.
- **Wall and roof type.**—Masonry or curtain walls and flat roofs without attics or with very small crawl spaces are much more difficult to insulate than are wood frame walls and roofs with attics and ample crawl spaces.
- **Mechanical system (HVAC) type.**—Physical changes to the way space heating or cooling is produced and circulated can provide significant increases in building efficiency but vary with the type of heating ventilation and air conditioning (HVAC) system used by the building.

Table 1.—The Gap Between Likely Energy Savings Through Retrofit and Technically Feasible Savings by the Year 2000: Building Types Covered in This Report (quadrillion Btus of primary energy)

	Projected energy use[a]	Technical savings potential[b]	Likely savings[c]	Gap: technical savings potential not realized
Multifamily buildings (all)	2.4	1.0	0.3	0.7
Commercial buildings (all)	6.3	3.5	1.3	2.2
Low income single family (all)	1.6	0.8	0.2	0.6
Moderate and upper income single-family homes in cities	3.5	1.8	0.9	0.9
Total buildings covered in this report	13.8	7.1	2.7	4.4

[a] Projected energy use in 2000 assumes no reduction from current energy use by these buildings and is based on a set of assumptions, that are described in the appendix to ch. 2, about demolition of existing buildings and construction of new buildings needing retrofit. A quadrillion Btu equals approximately 5000,000 barrels of oil per day for a year.

[b] The technical savings potential is defined as that resulting from all retrofits to these building types which as of 1981, are technically feasible and which would be cost effective over a 20-year lifetime, assuming no real increases in energy prices and a 3-percent real return on investment.

[c] Likely savings are those which are likely to come about from investments by building owners under current conditions of availability of capital, retrofit information, and public programs.

SOURCE: Office of Technology Assessment.

- **Building use.**—Most *commercial buildings* are used from 9 to 5 on weekdays (offices) or 9 to 9 daily (shopping centers) and are unoccupied outside these hours. This provides opportunities for improved energy efficiency by careful control of temperature and lighting between operating and nonoperating hours. Opportunities also exist for more efficient and task-specific lighting in commercial buildings. Finally, retrofits to the hot water system of *multifamily buildings* can usually save considerable energy.

Capital Costs

OTA reduced 43 potential combinations of the four building characteristics described above to 13 building types for which the lists of appropriate retrofit options are distinct (although there may be considerable overlap among them). The 13 building types are shown in table 2. **OTA identified no major category of building typically found in cities for which substantial savings were not available from retrofits of low or moderate capital cost compared to savings.**

For some of the building types, a major part of the potential savings are likely to come from retrofits of low capital cost compared to savings (see table 3) in the sense that they will pay for themselves in energy savings in 2 years or less and will earn real rates of return over the life of the retrofit (20 years on average) of more than 50 percent per year

Table 2.—Thirteen Types of Buildings With Significantly Different Retrofit Options

Building type and wall type	Mechanical system type	More energy savings from	
		Low capital cost[a] retrofit package[a]	Moderate capital cost[a] retrofit package[a]
Small house with frame walls (single family or 2-4 units)	Central air system	X	
Same	Central water system[b]	X	
Same	Decentralized system	X	
Small rowhouse with masonry walls (single family or 2-4 units)	Central air system		X
Same	Central water system		X
Same	Decentralized system		X
Moderate or large multifamily building (masonry or clad walls)	Central air system	X	
Same	Central water system	X	
Same	Decentralized system		X
Moderate or large commercial building (masonry or clad walls)	Central air system	X	
Same	Central water system		X
Same	Complex reheat system	X	
Same	Decentralized system	X	

[a] See table 3 for a definition.

[b] OTA's assumption is that this building type has a central water system and window air-conditioners.

SOURCE: Office of Technology Assessment.

Table 3.—Three Ways to Express the Relative Cost Effectiveness of Energy Retrofits

Relative capital cost[a]	Simple payback[b] (in years)	Annual real return on investment[c] (percent)
Low capital cost[d].........	Less than 2 years	More than 50% per year
Moderate capital cost[d]....	2 to 7 years	13 to 50% per year
High capital cost[d].........	7 to 15 years	3 to 13% per year
Cost of retrofit exceeds savings[e]...............	More than 15 years	Less than 3% per year

[a] See ch. 3 for a full definition. Low capital cost is defined as less than $14.00 per annual million Btu saved. Moderate capital cost is defined as $14.00 to $49.00 per annual million Btu saved. High capital cost is defined as $49.00 to $105.00 per million Btu saved. In all OTA's calculations in ch. 3, all electricity savings are multiplied by 2.46 to reflect the higher cost of electricity.

[b] Annual real discount rate that equates costs and savings over a 20-year measure lifetime. This assumes that fuel savings escalate at the same rate as inflation.

[c] Number of years for value of first year's energy savings to equal retrofit costs. Assumes value of energy savings is $7.00 per million Btu (approximately equal to the average price of distillate fuel oil in 1980).

[d] Compared to savings.

[e] Not cost effective.

SOURCE: Office of Technology Assessment.

assuming no increase in the real cost of energy. These building types include all small frame houses, moderate or large multifamily buildings with central air or water mechanical systems, and all commercial buildings except the usually older commercial buildings with water or steam heating systems and window air-conditioners. Clearly the problem of financing retrofits for these buildings should be minimized by the fast payback (and high return) of their retrofit options. Some of these fast payback retrofit options include wall insulation in frame buildings, economizer cycles which make greater use of outside air for air-conditioning in commercial buildings and hot water flow restrictors in multifamily buildings.

For all of the remaining building types, on the other hand, substantial savings are more likely to come from retrofit options of moderate capital cost compared to savings, which will payback in 2 to 7 years and whose real rate of return can range from as high as 50 percent to as low as 13 percent per year over a 20-year retrofit life (also see table 3). These building types include all small masonry rowhouses, moderate or large multifamily buildings with decentralized heating and cooling systems, and older commercial buildings with water or steam systems and window air-conditioners. For owners of such buildings there may be significant problems of financing substantial energy retrofits. Some examples of effective retrofits with moderate capital cost include: roof insulation and storm windows for masonry rowhouses, hot water heat pumps for multifamily buildings with decentralized systems, and replacing low efficiency window air-conditioners with more efficient models.

For most of the building types there are also retrofit options of high capital cost compared to savings with paybacks of longer than 7 years and annual real rates of return of less than 13 percent per year (over 20

years). If lifecycle costing is used, such retrofits may in fact be less expensive over the full life of the measure of the cost of the energy they would save. However, their very slow payback and low annual rate of return create serious financing obstacles. **For most of the building types OTA examined, such high cost retrofits would save no more than 20 percent of the full technical savings potential.** The three exceptions and the estimated percentage of total savings from high cost retrofits are:

- Masonry rowhouse with a heating system using air (40 percent).
- Masonry rowhouse with a water or steam system (25 percent).
- Large multifamily building with an air system (30 percent).

Examples of some high cost retrofits which produce substantial savings in certain building types include: wall insulation in masonry rowhouses and multifamily buildings and night-time window quilts in multifamily buildings.

Importance of Solar Retrofits

Passive and active solar system retrofits can reduce the energy requirements for space heating and hot water just as nonsolar energy retrofits can. OTA compared costs and energy savings of seven different kinds of solar retrofits to small and large residential building types. Many solar retrofits are of high capital cost (slow payback and low return on investment); a few are of moderate capital cost and none are of low capital cost. For all building types and retrofits examined there are nonsolar energy retrofits which save as much and cost the same or less. If chosen strictly on the basis of capital cost and effectiveness, the nonsolar retrofits would probably be chosen first, although there are many reasons including esthetic ones for choosing solar retrofits. Some cost-effective solar retrofits on some building types are identified in chapter 3.

THE DIFFICULTY OF PREDICTING THE OUTCOME OF A RETROFIT TO A PARTICULAR BUILDING

While the general prospects for cost-effective retrofit are good they may be very unpredictable for particular buildings. Extensive research and applied work on the retrofit of buildings to improve energy efficiency has only been underway for the past few years and most of this work has focused on single-family housing. **There are little data on the actual effects of building retrofits, and for some types of buildings there are almost no data.** Few energy auditors or building owners have maintained and made available careful records of preaudit fuel consumption, cost and type of retrofit, and postretrofit performance. A recent compilation of data on actual retrofits of commercial and larger multifamily buildings (see ch. 3) included data on 222 buildings. Among these, there was only one multifamily building, one shopping center, and four hotels. Most of the rest were schools and office buildings. **These data on actual retrofits confirm that, on average, considerable savings are possible from low and moderate cost retrofits.** For almost 90 percent of the buildings surveyed with good cost data available, the cost of the retrofit package installed paid back in energy savings in 3 years or less.

However, actual savings may be considerably higher or considerably lower than predicted for individual buildings. For the 60 buildings with data on savings predicted by an audit as well as actual savings achieved by the retrofit, actual savings varied in both directions (*more* than predicted and *less* than predicted) by a wide margin. For a group of 18 similar community centers, for example, actual energy savings averaged 85 percent of the predicted amount but varied (within one standard deviation) from 50 percent *more* than predicted to 80 percent *less* than predicted. Such results are only suggestive. Carefully designed data collection would be necessary to estimate more accurately the predictability of energy savings from different combinations of retrofit measures. The available data, however, are consistent with OTA's finding that there are inherent characteristics of building retrofit which are responsible for the substantial variation of likely savings from a particular retrofit from the predicted value. The variability can be reduced from its present level but it will probably remain substantially above zero.

Each structure is a unique combination of design, siting, construction, and previous retrofits. The behavior of the building occupants and the climate will also affect energy savings in unpredictable ways. These factors make it difficult to gather consistent data to determine the actual (compared to the theoretical) results of retrofit. Buildings with the same generic design will use energy differently due to the location of the structure in relation to the Sun. Further, buildings tend to vary in construction, even given the same design. Substantial amounts of energy can be lost through openings in interior walls, through leaky duct systems, and in other ways not obvious to the observer.

While there are methods commonly used to calculate heating loads, cooling loads, and other factors, these formulas best apply to a controlled situation rather than a real structure. As each energy retrofit is added to a structure, the system is changed, and very little is known about how to predict the interaction of several retrofits on a given building. Differences from building to building in the number of occupants and their living and working patterns (e.g., open windows v. air-conditioning) complicate the issue. In addition to behavior, microclimates and yearly weather changes will affect the actual amount of energy used. Thus, a researcher trying to figure out the real building energy use in a multifamily structure needs to know vacancy rate and local weather conditions that year as well as fuel use. Not all data are corrected for climate, and not all climate correction techniques are the same. It is even less common for data to be corrected for occupancy. The variation in data adds to uncertainty.

In many buildings increased energy efficiency depends heavily on building operation and maintenance. Some of the buildings described in the survey above failed to save as much energy as predicted because of poor performance by the equipment operator. For larger buildings, systematic improvements in operation and maintenance are likely to save as much or more energy as capital investment. An energy auditor can recommend these changes in practice but they are not permanent improvements and will affect the degree to which actual savings match predicted savings.

WILL OWNERS OF CITY BUILDINGS INVEST IN THE ENERGY EFFICIENCY OF THEIR BUILDINGS?

Given an investment with a probable high return but a possibility of partial or complete failure (as well as a possibility of greater-than-expected success), how are the owners of buildings in cities likely to respond to the opportunities to increase the energy efficiency of their buildings?

Energy is now important. After many years of energy price increases the cost of energy is now sufficiently important for building owners in the balance of income and expense of their buildings that steps have to be taken to control it. This is a change from general building owner opinion of several years ago.

Several categories of building owners with good access to equity capital, reliable professional advice on retrofits and a long holding strategy for their buildings are retrofitting their buildings and installing retrofits of low and moderate capital cost compared to savings. Institutional owners of buildings, such as insurance companies and pension plans, have set energy efficiency goals for their property managers and routinely make capital investments in energy efficiency if they will pay back in less than 5 to 7 years (see table 4). Large corporations which generally occupy any buildings they own also install retrofits with moderately long expected paybacks (3 to 5 years). Nationally syndicated partnerships also have generous payback criteria.

Several other categories of building owners with access only to debt financing and tight constraints on the building's cash flow are only installing the most cost-effective retrofits in their buildings. Small business owner-occupants and owner-occupants of multifamily buildings expect to hold their buildings for a long time and would benefit from retrofit, but they are severely constrained by lack of access to capital and generally cannot tolerate losses in cash flow. Individual and small partnership investor-owners of buildings require that energy retrofits pay back in 1 to 2 years. They have poor access to equity capital and poor access to professional advice.

The prospects for retrofit of commercial and multifamily buildings differ. With the exception of flourishing markets in dynamic neighborhoods in such cities as Washington, D.C., and San Francisco, multifamily

Table 4.—Retrofit Payback Criteria, Holding Periods and Access to Financing, and Advice for Different Types of Owners

Building owner type	Typical payback criteria	Building for own use?	Expected holding period	Access to capital	Inhouse professional advice
Owner-occupants.					
Large corporations	3-5 years	Yes	Long	Good	Good
Small businesses	1 year	Yes	Long	Poor	Poor
Multifamily owner-occupants	1-3 years	Yes	Long	Poor	Poor
Condominium	No data	Yes	Long	Mixed	Fair
Investor-owners					
Institutional owners	5-7 years	No	Long	Good	Good
Development companies	1-3 years	No	Short	Fair	Good
Partnership syndicates	3 years	No	Short	Fair	Good
Local partnerships	1-2 years	No	Short	Poor	Fair
Individuals	1 year	No	Mixed	Poor	Poor

NOTE: Long holding period = more than 10 years. Short holding period = 8 to 10 years.

SOURCE: Office of Technology Assessment.

buildings have suffered as a group from lagging rents and therefore lagging resale value (except as condominiums) that reduces their likelihood of retrofit below that of commercial buildings owned by the same owner. Where technically possible, owners of multifamily buildings have converted them to tenant utility meters so that owners will no longer be responsible for paying the utility costs. Owners of tenant-metered buildings have little or no current incentive to retrofit their buildings. Most believe that it will be a long time before owners of energy efficient multifamily buildings can charge higher rents than owners of similar but inefficient buildings.

The most likely buildings to be retrofit are office buildings, hotels, and department stores owned by a large corporation or institutional owner. The least likely to be retrofit are tenant-metered multifamily buildings owned by individuals or local partnerships.

Why Do Some Owners Forego the Large Potential Returns on Retrofit?

Most individual owners and many partnership owners will not invest in energy retrofits even if they payback in as short a period as 2 or 3 years. This unwillingness occurs despite the fact that a retrofit package with a 3-year payback will generate a very large return on investment—more than 33 percent real return per year—over a 20-year life of a retrofit installation.

High Cost of Finance

Much of real estate, including major development companies, is financed by debt not equity. In the terms of the industry, equity is "highly leveraged." A major portion of the financing for purchase of a new or existing building almost always comes from a mortgage. Additional financing for expansion, rehabilitation, repair, or retrofit of a building has traditionally come from refinancing a building with a new bigger mortgage at a similar rate of interest as the original mortgage. The recent increase in interest rates has effectively eliminated that option for most building owners. No one is likely to refinance a 7-, 9-, or 11-percent mortgage at 14- to 17-percent interest in order to get funds for rehabilitation or retrofit. The primary source of funds other than mortgages for building owners is a commercial loan. These are generally 18- or 24-month high-interest loans used for financing construction projects. During much of 1980 such loans were only available at variable interest rates 2 percentage points *above* the prime rate.

A building owner, unable to tolerate much reduction in the cash flow from a building, cannot manage anything but a retrofit with a very fast payback if his only financing option is a short-term high-interest loan. Figure 1 illustrates this clearly. A 2-year payback retrofit will generate more energy savings than it will cost in debt service, even at 22-percent interest, if it is financed with a 3-year loan or longer. A 5-year payback retrofit, on the other hand, will cost more the first year in debt service than it will generate in energy savings unless it is financed for at least 10 years at interest rates of 10 or 13 percent, or for 20 years at an interest rate of 16 percent.*

Impact of Risk

The problems faced by a building owner forced to finance a retrofit with short-term, high-cost debt are made much more serious by the uncertainty of the return on retrofit for his particular building, even though, on the average, the general prospects for retrofit are good. Based on the limited information cited earlier on the accuracy of audits, it is possible that savings from a retrofit could be 50 and even 70 percent *below* those predicted by an audit. (There is an equal likelihood that actual savings will be *above* predicted.) A predicted 3-year payback retrofit will turn into a 6-year payback retrofit if actual savings are 50 percent below the prediction, and it will turn into a 10-year payback retrofit if savings are 70 percent below what is predicted.

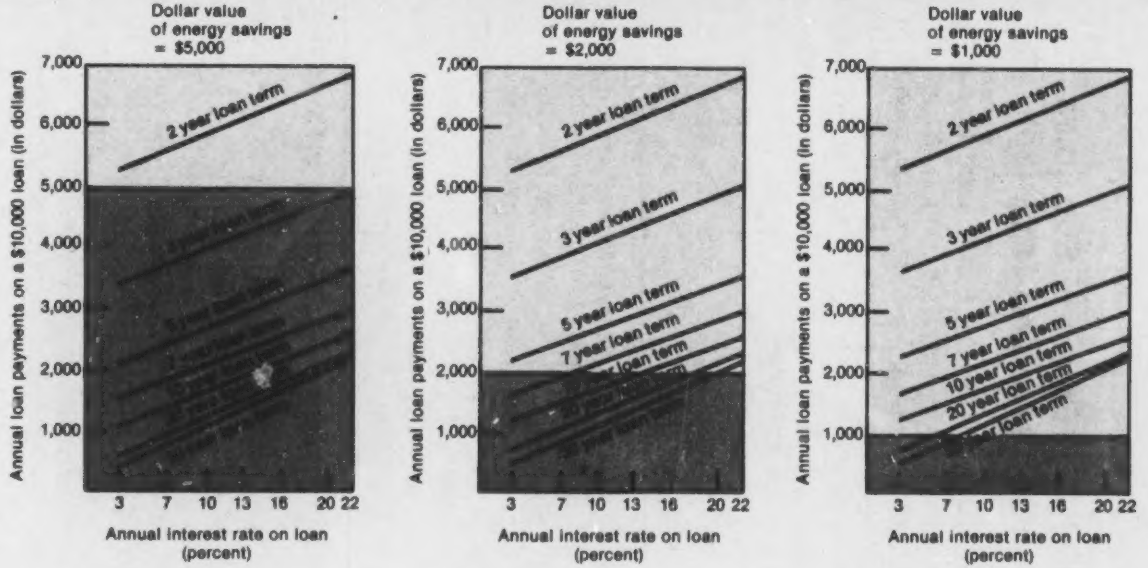
Extent of savings	*First-year savings from a $10,000 loan*	*Payback (in years)*
Predicted by an audit	$3,300	3
50 percent below prediction	$1,650	6
70 percent below prediction	990	10

It would be devastating, especially to many small business owners, or investor-owners of multifamily buildings, to carry the debt service for a major retrofit and fail to achieve the energy savings necessary to keep

---

*In years after the first year, inflation in energy costs (even if no faster than general inflation) will increase the value of energy savings relative to debt service. If energy costs increase at the rate of inflation, they will increase in current dollars and will be constant in real 1972 dollars, while fixed annual debt service payments are constant in current dollars and decrease in real 1972 dollars over time. Thus, any debt service payment in excess of fuel savings will diminish over time.

Figure 1.—Combinations of Loan Terms and Interest Rates Which Allow the Value of Energy Savings to Exceed the Cost of Borrowed Money the First Year



Case 1: Energy savings from a *2 year payback retrofit* (maximum payback considered by an individual or local partnership owner)

Case 2: Energy savings from a *5 year payback retrofit* (criteria used by corporations, insurance company owners)

Case 3: Energy savings from a *10 year payback retrofit* (maximum payback criteria of any owner interviewed)

Key:

☐ Cash flow *loss* the first year

■ Cash flow *increase* the first year

SOURCE: Office of Technology Assessment.

their cash flow up. Yet this is a realistic possibility given both the newness of the retrofit business and the individual nature of building energy performance.

The Impact of Two Forms of Subsidies: Lower Financing Costs and Tax Credits

Until interest rates drop, various subsidies from public sources or private sources such as utilities may be helpful. OTA analyzed some hypothetical multifamily buildings to determine whether a tax credit* or a financing subsidy might increase the ease of doing a retrofit and concluded from this analysis that a financing subsidy is more helpful in making retrofits possible and less expensive than a tax credit. The beneficial impact of a financing subsidy is greatest for a hypothetical low-rent high energy cost building typical of the low-rent end of the multifamily market. An unsubsidized retrofit loan (16-percent interest for 5 years) for a 6-year payback retrofit virtually wipes out the cash flow of this building.

A subsidy of approximately 15 percent to lower the interest rate and extend the loan term (13-percent interest for 10 years) restores the cash flow of the building immediately and increases it noticeably by the fifth year following the retrofit. (This analysis of hypothetical multifamily buildings is described in ch. 4.) Of the building owners interviewed, two-thirds preferred a financing subsidy to a tax credit. The one-third that preferred a tax credit included some partnerships that welcomed increased tax shelters, and also included some corporations that had adequate internal sources of finance but would benefit from a tax shelter.

When the Building Owner Is the Government

Energy use in buildings owned by local, State, or Federal government is significant. About 0.5 Quad of energy was used by public buildings in 1980 and about 1.5 Quads in educational buildings, most of which are publicly owned. Much like the corporate or large institutional owner, governments and school districts have annual formal budgeting procedures which identify the importance of energy cost increases and compare them from year to year. Governments and school districts have professional general property management department and often at least part-time energy advisors.

Unlike the corporate or large institutional owner, on the other hand, government owners of buildings have severe constraints on access to capital due to constraints on annual budgets and many kinds of limits on bonding authority. The result (see ch. 9) is that government owners of buildings often implement effective *operating* programs of improved maintenance and energy conservation practices by building occupants but restrict their *capital investment* in buildings to retrofits with 1 to 2 years payback. Only if the retrofit can be linked to other major repairs (such as roof insulation with new roofs) or if paid for by a Federal grant, are longer payback periods allowed.

---

*It should be remembered that a tax credit for energy retrofit is only one of several tax provisions that affect energy use and energy retrofit. Energy expenses are fully deductible as a business expense, while investments in energy retrofit can be partly deductible through deductions of interest rates and depreciation.

General Prospects for Retrofit of Buildings in Cities

Public programs and private campaigns to market increased energy retrofits of buildings must take into account the variety of motivations of building owners. Owners not likely to retrofit their buildings either lack financial reason to do so, lack feasible means to do so, or both. The implications for public policy and private marketing are different for each category.

The category of owners *willing and able to retrofit* (labeled category A in table 5) do not need any additional public incentives to retrofit. Many are prime targets for private marketing efforts by companies that specify

Table 5.—Owners Likely and Not Likely to Retrofit Their Buildings

Owners' access to finance and tolerance of risk	Importance of reducing energy costs to owner's goals	
	Important	Not important
Owner can both finance and absorb risk	***A. Willing and able to retrofit*** • Corporate owner-occupants of commercial buildings • Institutional vestor-owners of commercial and multifamily buildings	***B. Able but unwilling*** • Large partnership owners of tenant-metered multifamily buildings • Well-financed owners of office buildings and retail buildings in tight, energy-insensitive markets (large partnerships and development companies)
Owner can't risk and/or lacks financing	***C. Willing but not able*** • Owner-occupants of small multifamily buildings multifamily buildings • Small business owner-occupants • Individual and small partnership owners of master-metered multifamily buildings • Individual and small partnership owners of office buildings in energy-sensitive markets • Government owners of buildings	***D. Unwilling and unable*** • Individual and small partnership owners of tenant-metered multifamily buildings • Individual and small partnership owners of office or retail buildings with net or passthrough leases in energy insensitive markets • Owners of buildings in marginal areas

SOURCE: Office of Technology Assessment.

and/or install retrofit products. Category B is *able but unwilling to retrofit*. This category of owners would be expected to respond to increased requirement for energy efficiency in existing buildings. If required, they would have the means to carry out the retrofit.

Those owners that are *willing* and even anxious to retrofit *but lack access to low-cost finance and good technical advice and cannot tolerate risk* are labeled category C in table 5. These owners would be prime targets for marketing by successful private companies organized to put up capital and absorb the risk of retrofit. These owners are also likely to respond to public programs that reduce financing costs and lower the risk of retrofit.

The most difficult to motivate are the owners in category D for they are *both unwilling and unable to retrofit*. If local governments choose to require them to invest in the energy efficiency of their buildings (through an energy efficiency code for existing multifamily buildings, for example) local government must also see to it that financing of at least moderately long terms is available, or these owners will not be able to comply with the requirement. Owners of buildings in marginal areas are unwilling to invest in their buildings unless they believe the neighborhood is viable enough to recoup their investment in the resale value of the building. For such owners, an energy retrofit program is best folded into a general neighborhood rehabilitation program which combines concentrated private investment in one neighborhood with such public investment as improved sidewalks, storm sewers, and tree planting.

There are insufficient data on either the physical nature of the building stock or patterns of ownership to allow anything but very rough estimates of the amount of energy that might be saved by each of these categories of owners. OTA estimates that about 1 Quad of the 4-Quad gap in foregone energy efficiency retrofits is attributable to multifamily and commercial building owners that are willing but unable to retrofit because they lack financing and/or access to reliable information. Another 1.5 Quads of the foregone retrofits would be due to building owners that were unwilling to retrofit their buildings because they could see insufficient advantage in doing so. About two-thirds of these owners also lack access to financing or professional advice.

The rest of the estimated 4 Quads of foregone retrofits would result from moderate and upper income homeowners in cities unable or unwilling to finance retrofits of moderate and high capital cost compared to savings (about 1 Quad) and low-income homeowners (regardless of location) unable to finance any retrofits (about 0.5 Quad).

PROSPECTS FOR DISTRICT HEATING

District heating is a system for piping heat in the form of hot water (or steam) from a central source of heat to individual buildings. Under the right conditions a well-managed district heating system may be an energy efficient way of supplying heat to city buildings.

From a national energy perspective, district heating offers an opportunity to save fuel oil or natural gas by making use of the waste heat from electricity generation for space and water heating. Hot water district heating has been widely and successfully introduced in Northern Europe over the past three decades. District heat also offers an opportunity to shift from premium fuels such as natural gas and distillates to coal or renewable resources (including municipal solid waste) for supplying heat to buildings. To building owners who are district heating customers, it promises slower increases in energy prices. For local governments, district heating can be a tool in the overall task of economic development since it uses local workers for construction and operation, helps attract new development to central city locations, and helps to stabilize energy prices for existing buildings.

For all the possible advantages of district heating, however, the design, approval, construction, and successful operation of a district heating system is a formidable undertaking whose complexity and difficulty should not be underestimated. To be successful, a district heating system must offer heat at prices that are low enough to persuade owners of existing buildings to abandon their buildings' natural gas or fuel oil boilers or furnaces, retrofit their buildings to accept the hot water (or steam) from the district heating system and continue to purchase the district heat through the life of the system. Or the system must persuade owners of new buildings of the long-term advantages of foregoing the cost of their own heating system and equipping their buildings to take district heat rather than burn fuel directly.

If general interest rates lower substantially or a substantial financing subsidy is made available, hot water district heating could become a sensible long-term investment that stabilizes fuel prices costs over the long run in one or two dozen U.S. cities. **At current high interest rates and without special subsidies, large-scale district heating may be feasible for those few U.S. cities with dense areas of customers using expensive fuel oil, and a long enough heating season to make possible a reasonably high use of district heating capacity.** This number is less than five and may even be zero. However, small district heating systems for a small number of large buildings located close together may be feasible even at current high interest rates.

PROSPECTS FOR PRIVATE SECTOR MARKETING OF ENERGY RETROFITS

In theory, there should be ample opportunity for private businesses to fill the gap between the large potential return on investment in energy efficiency and the slow pace of retrofit among some types of buildings. Businesses willing to provide the capital over a long term and willing to absorb all or part of the risks of retrofits to individual buildings ought to be able to realize part of that return.

Investors could lease energy efficient equipment to building owners and claim the tax benefits for themselves. They could install energy efficiency measures and provide energy savings guarantees to building owners. Or they could take over responsibility for the energy costs of a building as energy management companies. In the latter case the investors, in return for a monthly energy management fee, would install energy efficient equipment and assume all responsibility for paying utilities.

In practice OTA was able to identify only a handful of enterprises providing retrofit capital or absorbing the risk of retrofit. In part this is the result of the general difficulties encountered by all new businesses in a time of high interest rates. Energy retrofit enterprises, however, also face several special problems. It is difficult to predict accurately energy savings from specific energy efficiency investments partly because much retrofit technology has not yet been installed in many buildings. It can be difficult to come to a legally viable agreement on what constitutes energy savings given variations in energy use caused by changes in weather, occupancy of a building, and occupant behavior. It can be difficult to agree on a definition of the equipment to secure the investment since much energy efficient equipment becomes part of the building it is installed in.

OTA was also able to identify only a few co-ops and nonprofit corporations involved in the retrofit of buildings. Co-ops and nonprofit corporations are hampered by lack of capital and the difficulties of managing a large-scale retrofit program.

WILL GAS AND ELECTRIC UTILITIES STIMULATE INVESTMENT IN ENERGY RETROFITS?

Rapid deterioration in the financial health and future prospects for many electric and gas utilities have created more than token interest in developing energy retrofit programs. Customers are increasingly vocal against utility rate increases at rate hearings. In response to increased prices, customer demand for electricity and gas has grown more slowly than forecast a decade ago and in some utility areas has actually declined. In an era of growth in interest costs and inflation in construction and fuel costs, lags in utility ratemaking have led to utilities earning less than the designated rate of return. In response to many of these problems, some utilities have developed energy efficiency improvement programs either to improve relations with customers, earn a greater return, or both.

Some utilities have energy retrofit programs in response to directives by their State regulatory commissions (e.g., Florida, New York, and California) and others developed energy audit programs on their own. In all, about 65 utilities offered residential energy audits as of the winter of 1977-78 *before* the Federal Residential Conservation Service (RCS) program was announced. Even if such audit programs are no longer mandated by the Federal Government under the RCS, many utilities are likely to continue them. Customer demand for utility audits, however, is likely to remain limited unless the utility markets audits vigorously with an eye to achieving measurable energy conservation goals.

A few electric utilities have built energy retrofit programs into their projections for future generating capacity and have deliberately exchanged planned new capacity for planned curtailment of demand. The New England Electric System (NEES) for example has announced a program to assist in the retrofit of commercial buildings for load management, thus reducing the need for new peak generating capacity. As now structured, the NEES program would not affect residential buildings much at all.

Theoretically, both slow-growing utilities, like NEES, which have time to plan and assess conservation, and fast-growing utilities, such as those in Florida who have to try everything to avoid falling short of meeting demand, could build energy retrofit programs into their strategic planning. In practice, utilities who do this must have the innovative leadership to develop new products, new marketing techniques, new customer relations, and new forecasting and monitoring techniques. **In a period when utilities are struggling against very difficult financial problems, OTA concluded that few may develop the leadership to undertake ambitious large-scale energy retrofit programs on their own**. A larger number of utilities may be willing to cooperate with State governments that are promoting energy retrofit programs as in Florida and California. As electric utilities become increasingly interconnected across State boundaries, there could be a role for the Federal Government in encouraging cooperation among State utility regulatory commissions as they integrate conservation goals and planned new electric generating capacity. Utilities, however, will continue to look to the State ratemaking process for encouragement or discouragement of conservation programs since State level ratemaking determines utility return.

PUBLIC SECTOR PROGRAMS TO STIMULATE ENERGY RETROFITS

Potential Role of City Governments in Urban Building Retrofit

A few visionary leaders in a few cities have created a link between the energy retrofit of local buildings and such broad goals as the long-term viability of the housing stock, and the long-term stability of regional income and economic productivity. They have promoted this view in speeches and reports and encouraged citizens to be aware of energy and its role in the city or region.

In most cities, however, citizens' worry about rising energy costs has been more directed at the local utilities, and mayors and city councils feel little pressure in city hall to do anything directly about energy. Most cities do not have active energy programs. Only 5 percent have full-time energy coordinators; most of the part-time energy coordinators spend less than 1 day a week on energy. The primary energy concern of most mayors and formally designated city energy coordinators is to reduce the growing share of energy cost in the cities budgets.

For some cities energy problems do "reach city hall" in the form of complaints about landlords' failure to provide adequate heat. In New York City, for example, the number of such complaints increased from 225,000 in 1978-79 to 320,000 in 1980-81. In cities where a metropolitan oversupply of housing softens the market for rental housing in the center city, the rapid increase in energy costs is sometimes perceived as a trigger for landlord abandonment of buildings. Such abandonment has been reported as severe in such smaller cities as Rochester, N.Y., and Springfield, Mass.

Many cities have incorporated energy retrofit into their housing rehabilitation programs. These are usually financed by Federal community development block grants (CDBG) or other housing rehabilitation funds. Linking retrofit to general housing rehabilitation has two advantages. It makes possible general repairs in roof or windows that are needed to make the energy efficiency measures work. It also addresses the concern of property owners confronting a retrofit investment that the building as a whole have resale value and that the neighborhood it is located in be economically stable. Housing rehabilitation programs in cities generally proceed neighborhood by neighborhood, often combining support for private rehabilitation with expenditures on such public works as sidewalks. **A program that promotes energy retrofit in the context of general property upgrading fits well with city government concern for the general health of the housing stock and the property tax base.**

Cities have other ways to promote building retrofit besides their housing rehabilitation programs. They may promulgate energy efficiency building standards at time of sale (Portland), issue municipal bonds to subsidize private retrofit expenditures (Minneapolis and Baltimore), or manage Federal weatherization directly and vigorously (Des Moines) rather than allow it to be administered by local nonprofit antipoverty agencies.

Potential Role of State Governments in Urban Building Retrofit

Some States have active energy audit or retrofit programs with potentially far-reaching results. Florida and California typify one source of motivation for States. Both States have rapidly growing populations and projected requirements for continued expansion of electrical generating capacity. Both States have difficulty finding large number of sites for new powerplants. Although their climates are mild and yearly energy bills lower than States with colder climates, both States face certain increases in natural gas prices and possible sharp increases in electricity prices if powerplant capacity must be added very fast. Florida and California have both required that utilities develop extensive energy audit programs, linked to slowdowns in construction of new generating capacity.

New York, Minnesota, and Massachusetts on the other hand have slowly growing or stable populations. State officials are not concerned about utility construction plans since utilities in these States are likely to face economic problems caused by excess generating capacity rather than the need to construct new generating capacity. Rather, State officials are motivated by concern about the health of the housing stock and hardship caused by the combination of high energy prices and severe winters.

States seeking to bring about large-scale retrofit have several possible tools to use. They may require high-powered utility audit programs (generally using the framework of the Federal RCS audit program), bring effective management to bear on the Federal weatherization program (Pennsylvania), require energy efficiency building code standards for new or existing buildings (Minnesota), or occasionally provide their own subsidized financing for energy retrofit (New Jersey).

For every State, however, which has developed programs to stimulate building retrofit, there are many States with similar concerns which have not developed active retrofit programs. Like cities, States have many other demands on their economic and managerial resources. Thus, State stimulus of building retrofit is likely to remain uneven, strong in some States and weak or nonexistent in others.

THE FUTURE: FEDERAL POLICY OPTIONS FOR STIMULATING THE RETROFIT OF BUILDINGS IN CITIES

Many programs developed or implemented by States and local government actually originated with the Federal Government. After 7 years of steadily increasing Federal involvement in energy conservation since the 1973 oil embargo, a basic shift in emphasis is now underway. All but a few of the Federal energy conservation programs have been substantially reduced in the 1982 budget.

The current debates about the proper role of the Federal Government in energy conservation, housing and community development programs, and assistance to the poor will affect the nature of the Federal role in stimulating the retrofit of buildings in cities. The following discussion of the Federal roles advocated by different parties to the debate.

Option A: No Direct Intervention

The rationale for this option for the Federal role is that energy retrofit is best left to the private sector. If managerial and legal problems can be solved, a wide variety of innovative, technical, and financial approaches will be developed by the private sector over the next decade to take advantage of the investment opportunities presented by retrofit. Efforts to reduce the high risk of retrofit by more accurate documentation of energy savings will eventually be better undertaken by trade associations and other private organizations with a stake in the results than they would be by the Federal or other levels of government.

Under this option, State governments and city governments would be free to develop energy retrofit programs of their own: States, as part of their regulation of public utilities; cities, as part of community development programs. Federal efforts to stabilize the economy, to allow accurate energy price signals and to lower interest rates are viewed as the only legitimate Federal role in accelerating retrofit opportunities.

Option B: Small Federal Market Assistance Role

Under this view, the private market must be assisted by the Federal Government because there is a strong national interest in higher energy efficiency, and because it is possible that the private market, by itself, is insufficient to satisfy national need and to maximize economic efficiency. On the other hand, according to this view, constraints on the Federal budget are severe enough to prohibit all but a small Federal role.

Even with a fairly low budget, however, the Federal Government could develop a clearly focused, research, development, and information program to reduce the risks of retrofit. Such a program is probably best modeled on private sector efforts in order to ensure maximum information exchange. Several restaurant chains have set up proprietary programs to test retrofits in different building types. Sears & Roebuck explicitly tested several kinds of retrofits in its stores before launching a multimillion dollar retrofit program. An ongoing Department of Energy program to test retrofits to hotels and motels and disseminate the results through the American Hotel & Motel Association could be expanded to other trade associations and other building types. The most urgent need is to document retrofits within the multifamily building sector and publicize them through the several multifamily trade associations.

Small-scale Federal retrofit subsidy programs, such as the schools and hospitals program and the Solar and Conservation Bank (described in ch. 9) would have the most impact if used primarily to increase knowledge and reduce the risk of retrofit. Public housing modernization funds used for energy retrofit of public housing could be used to document energy savings from energy retrofits. Under this approach, private building owners or public housing authorities receiving subsidies, would be asked to participate in a program to describe and document the results of the retrofit and disseminate it, through trade associations and chambers of commerce, to other building owners.

Option C: Large Active Federal Role

This Federal role would be consistent with both an activist philosophy of government and the view that reducing U.S. energy use over the long run is an important national goal for reasons of national security, minimizing disruption to the environment and maximum economic growth and competitiveness. Under the rationale for a high budget Federal role, if energy retrofit is the path of least total cost and if it is not likely to come about because of the nature of the energy problem and private markets, then the Federal Government should encourage and subsidize energy retrofit to the point where the major part of the cost-effective retrofit actually occurs.

This Federal approach should first and foremost include the risk-reducing activities described in the low budget approach above. A reduction in the perceived risk of a retrofit is essential if all building owners are to take advantage of a financing subsidy and make the investment. Vigorous promotion of State and utility development of audit programs for all building types and development of audit training programs would also, under this approach, help reduce the perceived risk of retrofit.

The Federal Government already provides a major financing subsidy to single-family homeowners in the form of a residential energy tax credit. About 4.8 million taxpayers used the credit in 1979 to make about $3.5 billion worth of energy efficiency investments. The credit cost the Treasury about $440 million. Multifamily building owners currently have no effective access to energy tax credits (although there is a narrowly defined business energy tax credit for improving the energy efficiency of industrial processes).

A new Federal effort to subsidize energy retrofit could either extend the energy tax credit to multifamily and commercial building owners or it could take the form of a program to subsidize interest rates and extend energy retrofit loan terms to such owners. OTA estimated the approximate size of a large-scale effort designed to produce 2 Quads of annual savings through retrofit at the end of 10 years. A subsidy used to lower annual interest rates by 2 to 3 percentage points and extend loan terms could subsidize about $4 billion worth of retrofits per year at an annual cost of about $600 million, a little more than the current cost to the Treasury of the residential energy tax credit (see table 6). (The assumptions behind this estimate are described in ch. 11.)

Table 6.—Two Forms of Federal Subsidy

Subsidy type	Cost per year	Energy impact	Estimated value of savings (in dollars)
Subsidized $40 billion in conventional loans over 10 years for energy retrofit	$600 million	2 Quads saved annually after 10 years	$14 billion to $30 billion per year
Ten district heating systems allowed to use tax-exempt financing ($1.5 billion each), constructed 10 years	$600 million	0.3 Quad displaced annually from fuel oil or gas to coal, solid waste or waste heat (after 10 years)	$1.2 billion per year

SOURCE: Office of Technology Assessment.

An active Federal approach might also include a financing subsidy for district heating, most conveniently by permitting tax-exempt bonds in magnitudes greater than the currently allowed $10 million. A subsidy to permit 10 systems of $1.5 billion each in 10 cities is likely to cost annually about 4 to 5 percent of the system (in foregone taxes on tax-free bonds). The 10 systems could be expected to displace about one-third of a Quad of fuel oil or natural gas and substitute coal, heat from solid waste, or waste heat from electricity generation.

Two Quads of energy savings per year is a substantial amount of energy. It is the equivalent of 1 million barrels of oil per day, or about 20 percent of all U.S. oil imports in 1981. It is also equivalent to about 36 electric generating plants of 1,00 MW each, at average utilization rates. There are two ways of estimating the value of 2 Quads of energy savings in 1981 dollars; they would be worth $14 billion at the 1981 average price for home heating oil of about $1 per gallon, or $20 billion to $30 billion at the current estimated price of synthetic oil from coal in 1981 dollars. (See the forthcoming OTA report on synfuels for further discussion).

The value of savings from an equivalent subsidy to district heating is much less. If district heating primarily serves to shift demand from premium fuels, such as oil and gas to coal, the savings comes from the price difference between the two kinds of fuel. At $4 per million Btu (about the current price differential between oil and coal for utilities), substituting 0.3 Quad of heat from coal for heat from oil would be worth $1.2 billion.

It also may be possible, although OTA has not analyzed this option, to achieve the same impact on energy retrofit not by subsidizing retrofit but by reducing or eliminating the tax deduction of energy costs as a business expense, since this tax deduction has the effect of subsidizing the inefficient use of fuel.

NOTE: Copies of the full report "Energy Efficiency of Buildings in Cities" can be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

General Information

Information on the operation of OTA, the nature and status of ongoing assessments, or a list of available publications may be obtained by writing or calling:

Public Communications Office
Office of Technology Assessment
U.S. Congress
Washington, D.C. 20510
(202) 226-2115

Publications Available

OTA Annual Report.—Details OTA's activities and summarizes reports published during the preceding year.

List of Publications.—Catalogs by subject area all of OTA's published reports with instructions on how to order them.

Press Releases.—Announces publication of reports, staff appointments, and other newsworthy activities.

OTA Brochure.—"What OTA Is, What OTA Does, How OTA Works."

Ongoing Assessments.—Contains brief descriptions of assessments presently under way with estimated dates of completion.

Contacts Within OTA

(OTA offices are located at 600 Pennsylvania Avenue, S.E., Washington, D.C.)

Office of the Director	224-3695
Congressional and Institutional Relations	224-9241
Energy, Materials, and International Security Division	226-2253
Health and Life Sciences Division	226-2260
Science, Information, and Natural Resources Division	226-2253
Administration Office	224-8712
Personnel Office	224-8713
Publications	224-8996

Senator Weicker. Mr. Moulton.

STATEMENT OF DAVID H. MOULTON, POLICY DIRECTOR, ENERGY CONSERVATION COALITION

Mr. Moulton. Thank you, Mr. Chairman. First, I would like to thank you for your leadership in this area, both in DOE and in your work on the Appropriations Committee, especially with regard to the solar and conservation bank.

I will run through very quickly some items that are mentioned in my testimony, or when they are not, I will submit them for the record, which I would like to bring to the attention of the Committee.

First of all, we have discussed this morning in some detail the misallocation of R. & D. priorities. In that regard, the ERAB report is particularly noteworthy, but I would also like to mention a report that also came out last November prepared for the Department by DHR, Inc., called, "Conservation and Solar Energy R. & D. Expenditures in International Comparison," which concluded that the effect of the planned U.S. Federal conservation and solar budget will be to place the United States at the bottom of the international lead in weighted terms possibly behind other small countries even in absolute terms in their energy conservation R.D. & D.

A second item which was mentioned in the most recent issue of "Energy Conservation Digest" is that, announces by Mr. Anderson, Mr. Chairman, that a $20 billion a year energy R. & D. budget could be justified in this country, and that establishing a strong R. & D. capability requires a great deal of time and effort, and that for the present, we should avoid destroying model capability we already have. In 1981, the United States spent about $7 billion in all energy R. & D., half funded by the Federal Government and half by industry.

Second, in the area of mismanagement, Mr. Chairman, I believe it is very important to begin to focus on the manner in which the Department is actually performing the functions that it has been required to perform by the Congress. This morning Senator Percy mentioned a memo that Assistant Secretary Tribble had written concerning the allocation of staff. This memo followed a series of memos from the staff below him pleading that adjustments be made in staffing levels, and I have several of those memorandums, and I would like to submit them for the record.

Essentially the answer they got from Assistant Secretary Tribble was rather than place staff that may be necessary, I am asking you to drop programs which I consider to be low priority.

As an example of what is happening now in the Department, Mr. Tribble testified not this morning but 2 weeks ago that the level of weatherization now at the Department is about 10,000 to 12,000 houses per month. That is about one-third of what they were weatherizing before they took, when the administration took office, although their budget has only been cut about 25 percent, so essentially you have a 66-percent drop in weatherization, 25-percent cut in the budget, and there simply is either enormous waste there or they are holding back funds.

Finally, Mr. Chairman, I think I would like to stress this issue of the difference between conservation as curtailment and forms of economic stagnation and conservation as increased efficiency. There is a fundamental distinction that the Department seems to totally disregard, despite the figure that they have thrown out as the total amount of that attributed to Government programs.

At a 5-percent-all-conservation measure which includes several types of conservation, that price alone brings—but which is not a percentage of efficiency changes, it is a percentage of permanent investment in efficiency, the estimate of Government programs is much more, much nearer to 20 to 25 percent. The 5 percent figure, as you know, in any case represents a value of about $3 billion in energy savings per year, which in 1980 was, in 1 year, it meant we earned back every cent we had spent on energy conservation since 1973, actually 9½ months.

The two other items I would like to insert for the record is the article that recently appeared in Forbes magazine which, let me quote just quickly, concluded, "Before you sell your last share of oil stock or trade your compact for a gas guzzler or give a sigh of relief for the end of high oil prices, consider the realities. Any way you look at the situation, it is an unholy mess. Far from fading away, the energy problem is as threatening as ever. Price changes in oil will not be gradual, not orderly. They will be the same kind of situation we experienced in the seventies," and it stresses this issue of the energy crisis has become an economic crisis that we are seeing in terms of unemployment rather than oil imports, and it is a tremendous mistake to become too complacent under the circumstances.

Georgetown Center for Strategic Studies has come to the same conclusion. "Even though higher world oil prices stimulate conservation, in the long run they appear to do so only at the cost of recession, inflation, and a massive transfer of wealth to foreign oil producers."

Finally, Mr. Chairman, Mr. Tribble mentioned that he, or implied that the number 5 percent which he attributes to Government programs, in energy savings, could be derived from the Hirst study.

In fact, the Department itself has its own internal study of this subject which they refuse to acknowledge at this point because while they pick out the 5-percent figure and have been using it as a criticism of the conservation programs, if you had before you the entire study you would find statements like the following. "Curtailment of energy consumption, declining labor productivity, lower standard of living, and slowing economic growth appear to be the predominant market response to higher energy prices at least in the near term," meaning the last 7 years.

The Department itself has analyzed the subject and concluded that higher energy prices alone are not going to give us the kind of permanent energy efficiency investment that we need. For that reason, we have submitted for your consideration alternative energy budget which stresses those programs which are designed to deal with market barriers, and we would hope you would give that serious consideration.

Thank you.

[The prepared statement and additional material submitted by Mr. Moulton follow. Testimony continues on p. 605.]

STATEMENT OF DAVID H. MOULTON

INTRODUCTION

Mr. Chairman, Members of the Committee, my name is David Moulton. I am Policy Director of the Energy Conservation Coalition. The Energy Conservation Coalition is a new organization representing more than six million people dedicated to improving the efficiency with which our nation uses energy. The Coalition was formed by a broad alliance of public interest groups including: the Conservation Foundation, the Environmental Defense Fund, the Environmental Policy Institute, the Federation of American Scientists, Friends of the Earth, the League of Women Voters of the United States, the National Audubon Society, the National Consumer Law Center, the Natural Resources Defense Council, Environmental Action, the National Wildlife Federation, the Sierra Club, the Solar Lobby, the Union of Concerned Scientists, and the National Consumers League.

We have invited a wide variety of local groups to join us. The response has been extraordinary. I can assure you that, whatever view may prevail in Washington, there is enormous enthusiasm for energy conservation at the local level. I suspect this reflects the fact that conservation programs are initiatives that people can take on their own or as a community to control energy bills and to provide inexpensive resources for local growth. They help directly the families and small businesses who pay big energy bills.

THE PRESIDENT'S BUDGET AND ECC'S ALTERNATIVE

Mr. Chairman, the Energy Conservation Coalition strongly objects to the energy conservation budget proposed by the Administration. The Administration's proposal would cut federal conservation programs by 97 percent--eliminating virtually every program. Table I (attached) shows the radical nature of the President's proposal. Congress has already cut energy conservation programs nearly 60 percent since the President took office. If energy conservation is to remain a viable element of national energy policy, the cuts must stop now.

The extent of these cuts is devastating. Virtually every energy program delivering benefits directly to individual Americans and small businesses is eliminated. Virtually every program to provide reliable information to individual Americans and small businesses so they can make economically rational energy use decisions is eliminated. The entire state apparatus designed to protect Americans from the catastrophic effects of a cutoff of foreign oil is being dismantled. The free market will be left to allocate supplies--but there will be no measures to temper the resulting inequities. A major interruption of energy supplies would result in a meteoric rise in gasoline and heating oil prices, but there is no mechanism in place to help those who cannot survive at those prices. And while the Administration proposes to leave individuals totally exposed to the vagaries of the marketplace, the President has continued (and in some cases, has expanded) government assistance to the oil, gas, nuclear and synthetic fuels industries. This double standard is at odds with previous energy policy espoused both by this Committee and by Congress itself.

We urge you to preserve cost-effective Federal energy conservation programs that will yield energy savings worth many times what the programs cost, thereby improving productivity, reducing our need for imported oil, creating jobs, and minimizing pollution. As a first step towards restoring some semblance of balance to national energy priorities, we have attached for your consideration an alternative energy conservation budget prepared by the Energy Conservation Coalition. For DOE, this budget totals $575 million, which coincides with the level authorized by Congress for FY 83 in the Omnibus Budget Reconciliation Act of 1981. Relative to FY 82 funding, it would increase the Industrial program; increase funding for Buildings and Community Systems; and decrease funding for Transportation. Most importantly, it would increase state and local funding to $393 million, including $220 million for Low-Income Weatherization, $110 million for Schools and Hospitals, and $30 million for the State Energy Conservation Program.

ENERGY CONSERVATION PROGRAMS ARE ESSENTIAL FOR A BALANCED ENERGY POLICY

The President's proposal demonstrates a fundamental misunderstanding of the limitations of our energy markets. At present the nation uses energy in an irrational manner. Our buildings, our vehicles, and our industrial processes are relics of an era of cheap energy. We continue to pay the ever-increasing cost of operating these relics, although we could substitute intelligence, prudence, maintenance, and better equipment for expensive and insecure supplies of energy. Moreover, major institutional barriers inhibit rational investment regardless of the price of energy.

Study after study has concluded that we waste energy on an appalling scale, that we could meet our needs using much less energy, and that we would thereby reap tremendous economic savings.[1] Like government waste, however, energy waste is embedded in the system. We must pursue affirmative policies to eliminate energy waste or it will go on sapping the economic strength of businesses and individuals for years.

Since the first oil price shock in 1973, the Congress has enacted at least 26 separate laws specifically addressing questions of energy. Although they do not express an altogether coherent Federal policy, there are three themes that run more or less consistently through the energy bills enacted during recent years: the promotion of domestic energy production; the assurance that energy production and use will take place without significant injury to the human environment; and energy conservation.

The wisdom of incorporating energy conservation into national energy policy has already been demonstrated. Last October 20, on the eighth anniversary of the first major energy price shock, the Energy Conservation Coalition released a report (attached) on the critical role that energy conservation has played since 1973 in promoting new growth while controlling energy inflation. As this report shows, major progress in reducing the amount of energy consumption required to generate a unit of GNP has permitted us to enjoy an 18 percent increase in GNP from 1973-80, while energy consumption has only had to increase 2 percent. Put another way, energy conservation has met 88 percent of the requirements of new growth over that period, while energy supply accounts for only 12 percent of the requirements.

Progress, however, should not allow us to become complacent. Anyone who pays energy bills knows that the energy crisis has just begun. Retail expenditures on energy in the U.S. increased from just 8 1/2 percent of GNP in 1973 to 15 percent of GNP in 1980. Annual energy expenditures already reached $385 billion in 1980--nearly $1750 per capita.[2] To the extent we have been able to increase efficiency in response to these price increases, it appears to have resulted largely from very low-cost, high payback measures or behavioral changes. And, although growth has continued since 1973, it could have been much higher but for recessionary effects about which none of us can be proud. Oak Ridge recently released a study concluding that as much as 50 percent of the reduction in energy use we experienced in 1980 was due to lower GNP.[3] Moreover, half of the other 50 percent was the result of behavioral changes that may be quickly reversed if the perception that the energy crisis has ended becomes widespread. Since the Administration does not distinguish between energy conservation that results from lower GNP and energy conservation that results from increased efficiency, it is not surprising that the President's budget would fall so heavily on programs targeted to increase both GNP and efficiency.

ENERGY CONSERVATION PROGRAMS ARE COST-EFFECTIVE

The Secretary of Energy testified recently that government energy conservation programs account for no more than 5 percent of the savings we have achieved to date. This suggests that these programs may be the most cost-effective activities currently undertaken by our government. A simple calculation makes this clearer. The energy savings in 1981 relative to 1973 was about 13.4 quads.[4] 5 percent of 13.4 quads is .67 quads, which is an annual savings in dollar terms of $3.4 billion dollars.[5] That exceeds total government spending on energy conservation since 1973 by .7 billion.[6] In other words, every government dollar spent on energy conservation since 1973 was saved back in a single year of energy savings. Since much of these savings stem from investments that last ten to twenty years, the Secretary has by his own words demonstrated the extraordinary cost-effectiveness of these programs. This should not surprise the Secretary, since most of these programs were carefully designed to address problems which the market does not adequately address. In fact, government programs undoubtedly account for a much higher percentage--perhaps as high as 20 percent--of that proportion of the savings that represent permanent investments in increased efficiency (as opposed to behavioral changes or lower GNP).

The General Accounting Office has also concluded that Federal programs to facilitate and supplement market forces are essential.[7] The GAO has found that significant savings will be achieved by the applicance efficiency program, low income weatherization, the residential conservation program, state grants, and the schools and hospitals program. The fuel savings available in institutional buildings alone approach four billion dollars each year, forty times the proposed cost of the DOE program.[8] The Oak Ridge National Laboratory has estimated that Federal conservation programs, if implemented, will reduce annual U.S. energy consumption by 2.7 quadrillion BTU's in 1985 and by 13 quadrillion BTU's in 2000, beyond savings that would be achieved in response to market forces. The present worth of the oil savings between 1981 and 2000 for these conservation programs is $50 billion.[9] (A collection of examples of successful DOE programs collected by Oak Ridge appears as Appendix I to this testimony.)

Internal DOE documents provide evidence that many other programs slated for elimination may be cost-effective. In a March 3, 1981 DOE memorandum assessing the cost-effectiveness of programs within the jurisdiction of Buildings and Community Systems at DOE, it was estimated that the cost per barrel of oil equivalent saved from 1980-2000 was as follows:

Voluntary BEPS	$ 5
Building Conservation (RCS)	$17
Appliance Standards	$ 3
Consumer Products	$ 4
Analysis & Tech. Transfer	$ 3
Community Systems	$16
Small Business	$ 6

If these programs were maintained, cumulative energy savings would reach 53 quads by the year 2000, at an average cost of less than $10 per barrel. (See Appendix II.) In contrast, an optimistic estimate of the cost of a barrel of synthetic oil is $30 - $60 in 1982 dollars.

Similarly, careful analysis of DOE's industrial conservation program shows that eliminating that program would eliminate an estimated annual savings of 9 quads over the life of the potential investments. (See Appendix III.)

There is no evidence that decision-makers at DOE have made any attempt to refute these documents, or to incorporate them into their decisions. Indeed, the evidence suggests that the Administration has consciously ignored the facts. Last summer, the Administration specifically requested a review of federal energy research priorities by the Energy Research Advisory Board, a panel of leading experts in business, academia, and government. Energy conservation stands out as one of only two R&D categories for which the group recommended higher federal funding than the mere $100 million that the President had requested for FY 82. The report states: "R&D funding for energy conservation...is underfunded, particularly when compared with funding levels for supply technologies. A balance that better reflects the opportunities, importance, and nature of the Federal role in supporting private sector response needs to be achieved."

Nevertheless, only two months after receiving the report, the President sent to Congress a budget that would cut energy conservation R&D more severely than any other category of research at DOE.

Similarly, DOE's Sunset Review is a disturbing paradox. The Summary Report contains familiar Administration assertions that higher energy prices can adequately replace government programs. Yet, a fair reading of the Program-by-Program Analysis, which reviews the program results, describes a series of highly successful programs. [11]

The fact is that, contrary to Administration assertions, higher prices are an insufficient energy conservation policy. Higher prices cannot eliminate barriers that Federal programs now slated for destruction were designed to overcome. Higher prices will not provide capital to individuals or businesses who lack the capital to invest in conservation. Higher prices will not provide information to consumers and businessmen who do not know what they can do to use energy more efficiently. Higher prices will not enable tenants to control the design and operation of the apartments and office buildings they occupy and whose energy operating costs they pay. Higher prices will not insure that we achieve the maximum cost effective improvements in efficiency, even though such improvements are incontrovertibly in the national interest.

THE MARKET AND LOW-INCOME WEATHERIZATION

The Low-Income Weatherization Program is a good example of how the principles sponsored by this Administration simply do not match their policies. The poor use less energy per capita than any other income class simply because they cannot afford to use more. Clubbing this population with higher energy prices simply reduces their standard of living to intolerable levels. The weatherization program provides the capital and expertise for permanent, long-term energy efficiency improvements otherwise impossible under low-income households' budgets. Such assistance also reduces pressure on cash assistance programs that ameliorate crises but do not address the root causes of soaring energy bills.

This program is fighting for its life. The Administration tried to eliminate it in FY 82. Congress cut it 20 percent. Now the Administration proposes again to eliminate the program, despite its proven ability to deliver a high volume of weatherization services. At the end of 1980, a backlog of unspent funds allowed the program to weatherize homes at a rate of over 350,000 units per year. Average energy savings of over 25 percent have been documented in several separate evaluations.[12]

To propose eliminating this program on the grounds that higher energy prices will get the same job done is sheer folly. The poor and the elderly will suffer, and some will die.

Other market barriers lie behind other energy conservation programs. For example:

*The Schools, Hospitals and Local Governments grant program was established because while these buildings tend to consume large amounts of energy, the means to invest in such energy efficiency in these buildings is limited. They are not eligible for tax credits, because they are tax-exempt. For investment capital, they rely on tax increases or bond issues at high interest rates or they must increase hospital rates. The federal program, which includes a 50/50 matching by non-federal dollars, had led to audits of 17 percent of schools and hospitals through 1980, and according to DOE, the $225 million in federal grants obligated to date has resulted in a total investment of $450 million, which is more than 30 percent of the total value of all construction put in place for schools and hospitals in 1978.[13]

*The Residential Conservation Service program was established to assist 60 million homeowners and tenants get expert information on energy saving investments in their dwellings. By requiring this service to be offered by large utilities, the direct cost to an individual homeowner can be kept low. 47 states have prepared plans and the program is well underway in most states. DOE has estimated that this program can save $30 billion in energy costs for the American public at a cost of less than $15 billion.[14]

Mr. Chairman, it is abundantly clear that you are being asked to make cuts on ideological grounds that have not and cannot be justified on substantive grounds. More important than preservation of any single program is the preservation of a rational process that treats major program redirections seriously and analytically, either directly, through substantive legislation, or indirectly through reordering of the budget.

Several consistent principles could be applied to maintain some coherence in national energy policy. The programs that most cheaply and quickly reduce our dependence on foreign oil could be saved. Conservation would fare extremely well if such a standard were applied. The programs most popular with individual Americans could be saved. Conservation would fare extremely well under that standard too. Equal cuts could be made in all programs. Conservation would do far better under that standard than it has. Or the federal government could truly get out of the energy business, eliminating the entire DOE budget, the Synthetic Fuels Corporation, the Price-Anderson Act, depletion allowances, and expensing of intangible drilling costs. Conservation would be the essence of energy policy if that happened.

But it does nor make sense to single out conservation programs for cuts. It does not make sense to cut programs that work. It does not make sense to allow energy policy to be made with a fine point pen on a budget document. Skimping now on spending for conservation simply means paying higher costs for energy in years to come. If we make investments now--in buildings, industries, autos--we can make our economy more energy efficient and thus immensely more productive and healthy in the future.

We would be happy to work with you, Mr. Chairman, in fashioning a fair, responsible, and cost-effective energy conservation budget to accomplish that goal. Thank you.

TABLE 1

Prepared by:
David Moulton
Energy Conservation
Coalition

OVERVIEW OF THE FEDERAL ENERGY CONSERVATION BUDGET

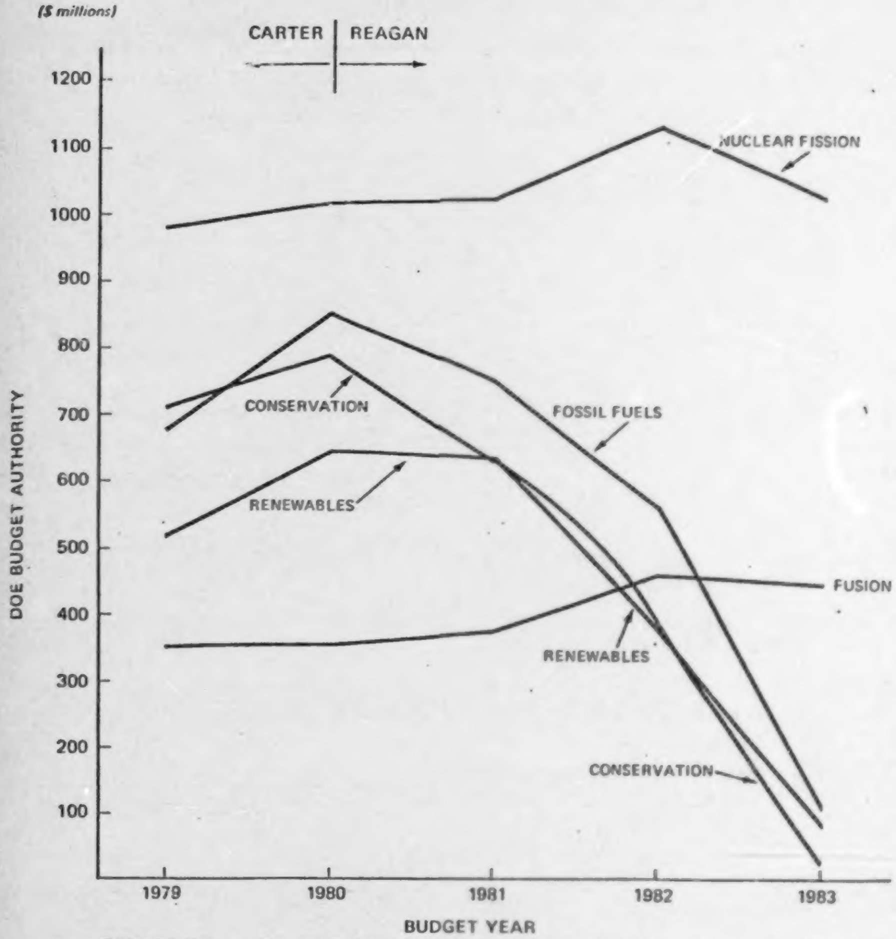
(IN MILLIONS OF DOLLARS)

	FY 81		FY 82		FY 83
DEPARTMENT OF ENERGY (DOE)	pre-rescission	post-rescission	reconciliation [1]	appropriation	Reagan
BUILDINGS AND COMMUNITY SYSTEMS	113.8	76.8 [2]	77.6 [2]	47.7	0.0 [4]
INDUSTRIAL ENERGY CONSERVATION	89.7	68.9	32.1	20.8	0.0 [4]
TRANSPORTATION ENERGY CONSERVATION	119.7	99.0	64.5	58.9	0.0 [4]
STATE AND LOCAL	452.9	404.7	331.0 [3]	234.2 [3]	4.3
MULTISECTOR	26.5	26.5	20.0	16.5	17.5 [4]
DOE SUBTOTAL	802.6	675.9	545.1	386.1	21.8
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD)					
SOLAR AND CONSERVATION BANK	123.0	0.0	50.0	23.0	0.0
HUD SUBTOTAL	123.0	0.0	50.0	23.0	0.0
TOTAL	925.6	675.9	595.1	409.1	21.8

[1] The Omnibus Budget Reconciliation Act of 1981; Conference Rept. No. 97-208
[2] Includes Urban Waste and capital equipment
[3] Includes Energy Extension Service
[4] Small remnants of each program have been lumped into the single multisector category

TABLE 2

TRENDS IN FEDERAL ENERGY FUNDING



SOURCE: Subcommittee on Energy Conservation and Power, Committee on Energy and Commerce, U.S. House of Representatives

FOOTNOTES

1/ See, e.g., Solar Energy Research Institute, A New Prosperity: Building A Sustainable Future, (Andover Mass.: Brick House Publishing, 1981); John H. Gibbons and William U. Chandler, Energy--The Conservation Revolution (New York: Plenum Press, 1981); Marc H. Ross and Robert H. Williams, Our Energy: Regaining Control (New York: McGraw-Hill, 1981); Henry Kendall and Steven Nadis, Eds., Energy Strategies: Toward a Solar Future, (Cambridge, Mass.: Ballinger: 1980); Hans H. Landsberg, Chairman, et al., Energy: The Next Twenty Years, Report by a study group sponsored by the Ford Foundation and administered by Resources for the Future (Cambridge, Mass.: Ballinger Publishing Company, 1979); National Research Council, Energy in Transition: 1985-2010, Final Report of the Committee on Nuclear and Alternative Energy Systems, National Academy of Sciences (San Francisco: W.H. Freeman and Co., 1979); Robert Stobaugh and Daniel Yergin, Eds., Energy Future, Report of the Energy Project at the Harvard Business School (New York: Random House, 1979); Roger Sant et al., The Least Cost Energy Strategy, The Energy Productivity Center, Mellon Institute (Pittsburgh: Carnegie-Mellon University Press, 1979); Domestic Policy Review Panel, The Domestic Policy Review of Solar Energy, A Response Memorandum to the President of the United States (U.S. Department of Energy, February 1979) TID-22834.

2/ $385 billion is the calculation of Dr. Robert Williams, Center for Energy and Environmental Studies, Princeton University.

3/ Hirst, Eric, et al. Energy Use from 1973 to 1980: The Role of Improved Efficiency, Oak Ridge National Laboratory, ORNL/CON-79, pp. 38-39.

4/ See Energy Conservation: The Road to New Growth in an Era of Uncertain Supply, Report of the Energy Conservation Coalition, Washington, D.C., October, 1981, p.3.

5/ In 1980, 1 quad was worth $\frac{385}{75.2} = \$5.05$ billion.
($5.05) x (.67) = $3.38 billion.

6/ See Energy Conservation: Emerging Consensus, Diverging Commitment, Subcommittee on Energy, Joint Economic Committee, U.S. Congress, December, 1980, p.20.

7/ United States General Accounting Office, Views on Energy Conservation and the Federal Government's Role, EMD-81-82, June 17, 1981, p. 1.

8/ Ibid.

9/ Hirst, Eric et al., Improving Energy Efficiency: The Effectiveness of Government Action, Oak Ridge National Laboratory, April, 1981.

10/ Energy conservation R&D would be cut from $182 million in FY82 to $17.5 million in FY83.

11/ See, especially, pp. 187-216.

12/ See, e.g., Consumer Energy Council of America, "A Comprehensive Analysis of the Costs and Benefits of Low-Income Weatherization of Its Potential Relationship to Low Income Energy Asssitance", June, 1981.

13/ U.S. DOE, Sunset Review, Feb. 1982, Vol. 2, p. 216.

14/ U.S. DOE, Residential Conservation Service Program, Regulatory Analysis, October 1979, pp. 2-20, 2-303.

APPENDIX I-1

HEAT PUMP WATER HEATERS: A NEW TECHNOLOGY

The Department of Energy sponsors and cost-shares a variety of R&D projects related to high-efficiency technologies. These projects are designed to improve performance of energy-using systems, lower their initial costs, and reduce uncertainties about both costs and performance for manufacturers and consumers.

The heat pump water heater is a new technology developed by private industry with government funds. The system reduces the amount of electricity needed for water heating by up to one-half. The extra cost relative to a conventional electric water heater is about $600, which is repaid in one to four years (depending on hot water use and local electricity prices). The system is basically a room air conditioner with a conventional hot water storage tank. The unit extracts heat from the surrounding air and "pumps" it into the hot water.

As a direct result of a competitive procurement issued by DOE, about $700 thousand were spent on development and testing of the heat pump water heater during the past four years. In addition to extensive laboratory tests, DOE is field-testing 100 units in cooperation with 20 electric utilities throughout the country.

The information obtained from these laboratory tests and field demonstrations was sufficient to induce four companies to produce and market heat pump water heaters. Fedders, a major manufacturer of refrigeration equipment, publicly stated that their decision to enter the heat pump water heater market was due primarily to the published results of DOE efforts to reduce uncertainties about this new technology.

The units are likely to be widely accepted by consumers because of their relatively low cost (e.g., they save about as much energy as do solar water heaters at one-third the installed cost), rapid payback, and compatibility with existing systems. The heat pump sits on top of the conventional water heater; therefore the entire unit takes up no more floorspace (and requires no additional wiring or plumbing) than does a conventional electric water heater.

Sources: Energy Utilization Systems, Inc., *Research and Development of a Heat-Pump Water Heater*, prepared for the Oak Ridge National Laboratory, ORNL/Sub-7321/1, August 1978; Energy Utilization Systems, Inc., *Demonstration of a Heat-Pump Water Heater*, ORNL/Sub-7321/3, December 1979.

I-2

ESTIMATED BENEFITS OF GOVERNMENT PROGRAMS: THE RESIDENTIAL SECTOR

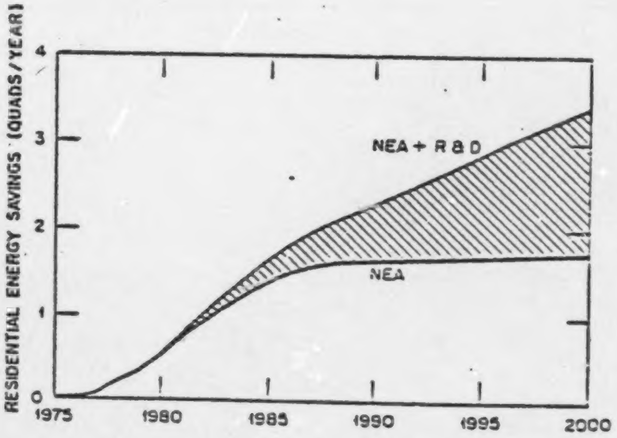
The federal government has several programs underway to improve efficiency of energy use in the nation's homes. These include the Energy Extension Service, State Energy Conservaton Program, Residential Conservation Service, Low-income Weatherization Assistance Program, appliance efficiency labels, Residential Energy Conservation Tax Credit, proposed buildings energy performance standards, proposed appliance efficiency performance standards, and many R&D projects designed to spur commercialization of improved technologies for new construction, appliances, and equipment and for retrofit of existing homes.

The graph below, based on computer analysis at Oak Ridge National Laboratory, shows how the energy savings - due to government regulations, financial incentives, and information programs; and to government development of new technologies -increase over time. Energy savings from government programs increase rapidly through the early 1980s and then only slightly from 1985 to 2000. Research benefits, on the other hand, grow slowly at first, but then in the 1990s grow much more rapidly.

The energy savings shown also yield large economic benefits to households. Between now and the year 2000, fuel bills are reduced because of these government activities by about $41 billion. On the other hand, the higher cost of more efficient equipment and structures amounts to $22 billion. Thus, the net benefit to households is $19 billion, with an overall benefit/cost ratio of almost two. The nation saves energy and consumers save money.

In addition to these direct benefits, society also gains additional employment. Although jobs are lost in the energy supply industries; additional jobs become available in the construction industries, in equipment and appliance manufacture, and in the economy as a whole as a result of the respending effect (i.e., the money saved by households due to these conservation programs is spent on other goods and services, which increases employment). Annual increases in employment reach a few hundred thousand jobs per year by the end of the century because of these programs.

Source: E. Hirst, "Effects of the National Energy Act on Energy Use and Economics in Residential and Commercial Buildings," Energy Systems and Policy, 3(2), 1979.



Estimated energy savings in the residential sector due to implementation of federal conservation programs (the National Energy Act, NEA) and government development of new technologies.

DOE'S LOW COST/NO COST ENERGY CONSERVATION PROGRAM

The Low Cost/No Cost Program was developed by the Department of Energy to inform households in New England about 11 inexpensive actions they could take to cut their home energy bills. The program was aimed at the six New England states-- Massachusetts, Vermont, Connecticut, Rhode Island, Maine, New Hampshire-- because of the region's heavy dependence on foreign oil.

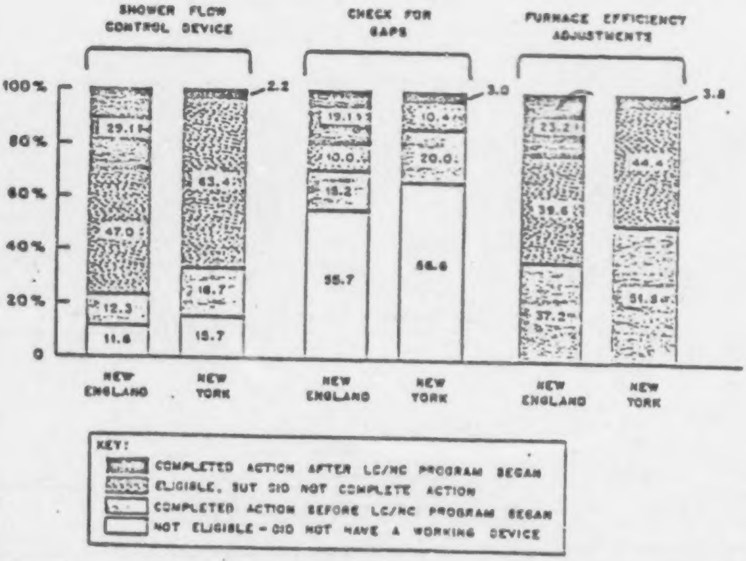
During November 1979, DOE mailed a water flow restrictor and a booklet describing the conservation measures to each of the 4.5 million households in New England. In addition, DOE sponsored an advertising campaign including television, radio, and print media. Finally, DOE arranged for public awareness activities including press conferences with New England governors, newspaper articles and editorials, and radio public affairs talk shows.

According to an evaluation conducted by Booz, Allen and Hamilton, the program was a remarkable success. Telephone surveys with a sample of New England households and a control group of households in upstate New York showed that the program encouraged many New England households to adopt one or more of the 11 recommended measures. In particular, 29% of the New England households installed the water flow control device after the program began. By comparison, only 2% of the New York households installed such devices during this period. Similar positive (and statistically significant) results were also obtained for two other measures: checking for gaps around the fireplace and improving furnace efficiency.

Based on the savings for these three measures alone, DOE estimated a reduction in fuel bills for New England households of $69 million a year ($345 million over a five-year period). The estimated energy saving is equivalent to 2.6 million barrels of oil a year, of which more than 60% is a direct reduction in oil use. Roughly speaking, every dollar spent on this program yielded a saving of about $20 in reduced fuel bills.

Source: U.S. Department of Energy, The Low Cost/No Cost Energy Conservation Program in New England, An Evaluation, DOE/CS/21366-01, July 1980.

COMPARISON OF REPORTED CONSERVATION ACTIONS
OF HOUSEHOLDS IN NEW ENGLAND AND NEW YORK



I-4

RETROFIT POTENTIALS AT INSTITUTIONAL BUILDINGS

During the past two years, a group of trained energy auditors from the Oak Ridge Associated Universities (ORAU) conducted audits at 48 hospitals in four states (New York, Virginia, Pennsylvania, Tennessee). The audits included reviews of hospital utility bills, examination of blueprints and equipment specifications, discussions with hospital operating personnel, walk-through of the facility, detailed data collection within the hospital, and subsequent calculations and analysis.

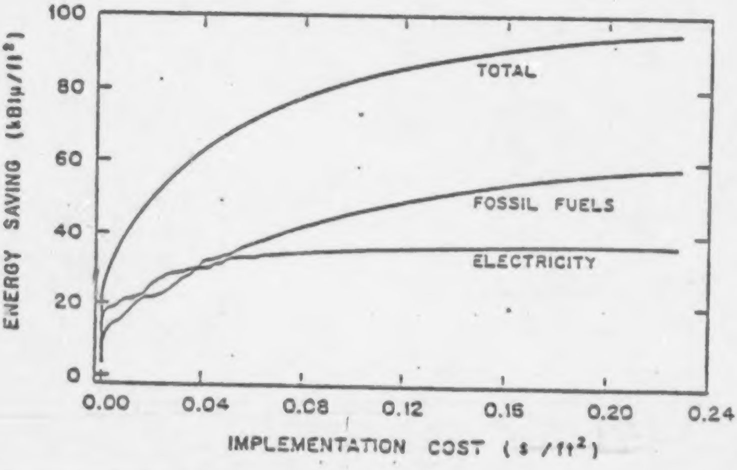
Their results are startling. Of the almost 900 audit recommendations made by the ORAU staff, more than 100 involve no capital cost at all. These measures would cut energy use at the typical hospital by more than 5% of baseline energy use. Implementing all the recommendations offered would cut energy use by about 100 thousand Btu/ft^2, equivalent to more than 20% of baseline energy use. The investment required to make these energy-saving changes would be repaid with lower fuel bills in about one year.

The fact that these measures, most of which are quite inexpensive, were not being adopted at the hospitals suggests that government programs are needed to inform and motivate managers of institutional buildings about the benefits of these cost-effective conservation measures. The federal Institutional Conservation Program (ICP), created by the 1978 National Energy Conservation Policy Act (NECPA), is designed to do just that. It offers matching grants to schools, hospitals, local governments, and public care institutions to audit and retrofit their buildings.

Assume that the potential energy savings uncovered at these 48 hospitals is typical of that in the 450 thousand buildings eligible for the ICP. The potential - and largely untapped - energy saving is more than 0.7 Quads, of which almost 0.5 Quads (equivalent to more than 200 thousand bbl/day) is natural gas and oil. The value of the oil and gas savings to these institutional buildings amounts to about $4 billion a year. If the value of oil to society (i.e., the oil import premium) is about $10/bbl, then the additional benefit to society of these fossil fuel savings is almost $900 million a year. NECPA authorized a total of $900 million of federal matching grants for the ICP; the above calculations suggest that this federal investment will be repaid very quickly.

Sources: J. Stelson, Energy-Use Data for Audited Hospitals, Oak Ridge Associated Universities, February 1981; Institutional Conservation Program, Summary of Reports by States of Preliminary Energy Audits and Energy Audits, U. S. Department of Energy, September 1980.

AUDITS AT 48 HOSPITALS SHOW LARGE POTENTIAL ENERGY SAVINGS



I-5

HOUSEHOLD RETROFIT ACTIONS: THE NEED FOR GOVERNMENT PROGRAMS

In late 1978, DOE's Energy Information Administration conducted a survey of four thousand households. Results from this survey, based on a detailed home interview, provide considerable information on household energy use and retrofit actions.

The survey included questions on household actions to conserve energy that had been taken in 1977 and 1978: inexpensive measures such as caulking and addition of plastic coverings on windows, as well as more expensive measures such as attic and wall insulation. Altogether, questions were asked about 11 different conservation actions.

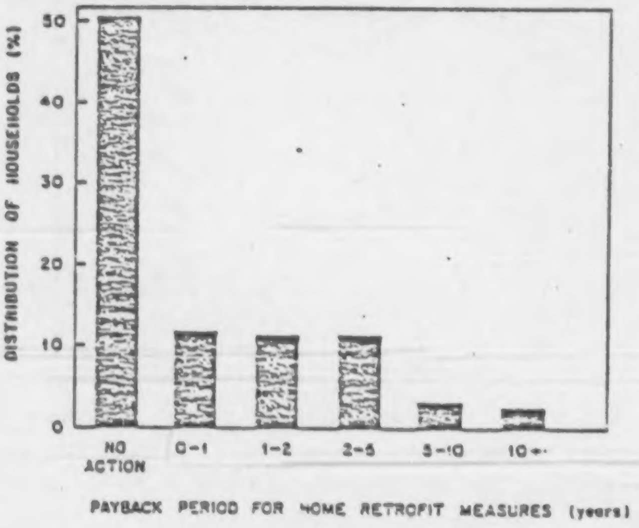
Analysis of the EIA survey results showed that more than half the households took no retrofit action during the two-year period covered. These households are different in many ways from those who did implement conservation measures. The "retrofitters" were, on average, two years younger, had annual incomes of almost $2000 more, lived in homes that were three years older, were more likely to own their homes, were more likely to live in single-family homes, and had higher fuel bills (by about 10%) than did the nonretrofitters.

The housholds that did install some conservation measures tended to pick only the very inexpensive measures. Only one-fourth of these households installed measures with a payback of more than five years.

These results suggest considerable additional potential to reduce energy use in homes. Two government strategies are implied by the survey data. First, programs are needed to encourage nonretrofitters to adopt at least some conservation measures. Second programs are needed to encourage those who have already adopted some measures to implement the more expensive but cost-effective measures that are generally not being adopted yet. DOE's Weatherization Assistance Program is aimed at retrofitting homes of elderly and low-income households (two groups shown by the EIA survey who are not doing so on their own). The Residential Conservation Service and Energy Extension Service are aimed at encouraging other households to implement additional cost-effective measures that the EIA survey shows are not being widely adopted.

Sources: Energy Information Administration, Residential Energy Consumption Survey: Conservation, U.S. Department of Energy, DOE/EIA-0207/3, February 1980; E. Hirst, R. Goeltz, and J. Carney, Residential Energy Use and Conservation Actions: Analysis of Disaggregate Household Data, Oak Ridge National Laboratory, ORNL/CON-65, forthcoming.

HOUSEHOLD RETROFIT ACTIONS IN 1977 AND 1978



I-6

MARKET FAILURES ASSOCIATED WITH ENERGY EFFICIENCY OF NEW HOMES

A key issue related to the need for government programs is the question "How well does the market work in leading to decisions that are optimal from society's point of view?" A recent analysis of the thermal performance of new homes constructed in 1976 sheds some light on this question.

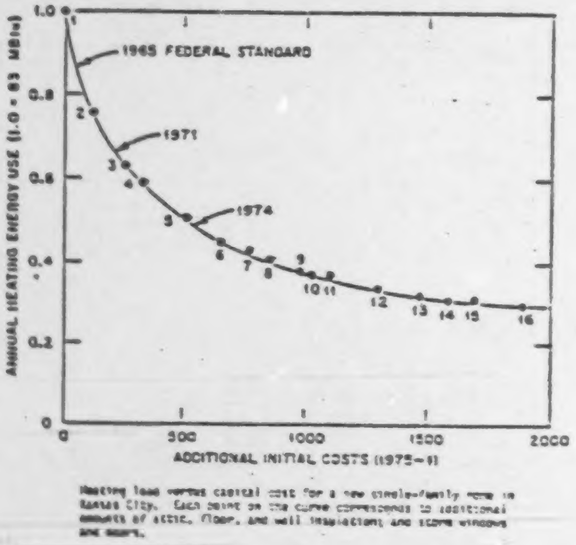
Engineering analyses of new home design in ten different cities around the country led to curves such as that shown below for Kansas City. In each case, the first few dollars of extra investment in energy efficiency yield large energy savings, while further investments yield decreasing marginal energy savings (the well-known law of diminishing marginal returns).

Using data collected by the National Association of Home Builders, the analysis compared the actual construction of new homes (insulation levels in attic, floor, walls; window and door glazing) in these ten cities with the engineering cost relationship described above. This comparison showed where on the energy use/capital cost tradeoff curve houses were being constructed. Using values for heating and cooling degree days and fuel prices specific to each city, the marginal rate of return to investments in thermal performance was computed for each city.

The results showed a wide range in rates of return, all of them considerably higher than the estimated market rate of return (3% real, net of inflation). For example, electrically heated homes in Washington, D.C. were built in 1976 at levels of thermal performance that imply a required marginal rate of return of 100% (i.e., a one-year payback on the investment). The actual level of thermal performance corresponds roughly to point 6 in the figure. If investment had included measures to the point at which the marginal return was 3% (real), energy use for the new home would have been about 35% less than it was (roughly point 14 in the figure).

These results provide strong evidence that the new housing market is not economically efficient. Decisions made by home builders and buyers imply extremely high discount rates, rates that yield a serious underinvestment in energy-efficient structures and heating equipment. Possible explanations for this market imperfection include lack of information for both builders and buyers, inability of buyers to adequately process the relevant information, difficulties in obtaining construction loans and mortgages to cover the extra cost, and uncertainties over the effect of these improvements on resale value. Although the data and analysis do not show which government programs would be most effective in reducing the enormous disparity between private and social discount rates, the need for some such action is clear.

Sources: D. O'Neal, K. Corum, and J. Jones, An Estimate of Consumer Discount Rates Implicit in Single-Family Housing Construction Practices, Oak Ridge National Laboratory, ORNL/CON-62, 1981; National Association of Home Builders Research Foundation, Thermal Characteristics of Single-Family Detached, Single-Family Attached, Low-Rise Multifamily, and Mobile Homes, October 1977.



Heating load versus capital cost for a new single-family home in Kansas City. Each point on the curve corresponds to additional amounts of attic, floor, and wall insulation, and storm windows and doors.

FEDERAL ENERGY-EFFICIENCY STANDARDS: NEW CAR FUEL ECONOMY

Between 1978 and 1979 and again between 1979 and 1980, U.S. gasoline consumption declined. These declines were due to a combination of higher gasoline prices, shortages during the summer of 1979, and a single government program-- the Corporate Average Fuel Economy (CAFE) standards.

The CAFE standards were established by the 1975 Energy Policy and Conservation Act. The standards began at 18 mpg in 1978 and increase to 27.5 mpg in 1985.

A recent econometric analysis estimated the energy-saving impact of the CAFE standards. The major assumption in this analysis is that the domestic auto manufacturers would not have raised average fuel economy of new cars beyond the 1977 level until 1982. This assumption is supported by the relative price stability (indeed some declines in price) for gasoline after the 1973 oil embargo, consumer demand during that time for large cars, and published statements of auto manufacturer representatives.

The analysis shows that the CAFE standards reduced gasoline consumption by 80 thousand bbl/day in 1978, 220 thousand bbl/day in 1979, and 400 thousand bbl/day in 1980. (These savings are roughly equal to the reductions in oil imports from Iran for 1979 and 1980.)

In addition to the direct economic benefits to automobile purchasers and users, society as a whole benefits. Reduced oil consumption is translated into lower oil imports, which has obvious benefits in terms of foreign policy and balance-of-payments. If the social oil import premium is $10/bbl, then the value to society of the 1980 savings alone equals about $1.6 billion.

These results suggest that the government standards created a stable environment in which the auto manufacturers could operate. Without that stability, the volatility of gasoline prices and gasoline availability during the past several years would have led to increased U.S. oil consumption, greater reliance on oil imports, additional balance-of-payments deficits, and even greater competition from foreign automobile manufacturers.

Sources: *Automotive News*, several issues in 1978, 1979, and 1980; D. L. Greene et al., *ORNL Highway Gasoline Demand Model Documentation*, Oak Ridge National Laboratory, draft, 1980.

THE RCS MODEL ENERGY AUDIT: AN EXAMPLE OF EFFECTIVE TECHNICAL ASSISTANCE

A model residential energy audit inspection and calculation procedure, plus instruction materials to train auditors, were developed by DOE for the Residential Conservation Service. The RCS, part of the National Energy Conservation Policy Act, requires large utilities to provide energy audits to their customers. There are no other audit procedures or training materials in the public domain that are appropriate for use in the RCS.

The model audit is a technical assistance aid that can be voluntarily used in whole or part by any state, utility, or consulting firm. The audit provides a benchmark that privately developed procedures can be measured against, and demonstrates the feasibility of providing detailed energy saving estimates with a low-cost procedure.

The model audit was developed to meet requirements of simplicity, cost-effectiveness, and technical accuracy. The procedure is self-contained and can be effectively used without computers or instrumentation. This is important to small utilities with limited resources. The procedure can be mastered by a high school graduate, but two years of post-high school education is preferred. Approximately three weeks of special training is required.

The audit materials are sufficiently flexible that individual utilities can adapt it to their special needs. For example, some utilities have good conservation programs that do not cover all the RCS program measures. These utilities have been able to retain their existing audit procedures and adapt the model audit to cover the program measures that are new to them. Large utilities with extensive computer capability prefer to computerize their audit calculations; many of them computerized the RCS model audit.

The model materials were extensively tested by cooperating utilities across the country. The testing program revealed some minor errors that were corrected, but generally validated the accuracy and workability of the model audit in all sections of the country.

The model audit represents an enormous economy of scale. A procedure useful anywhere in the country was developed by DOE. Hundreds of utilities are including the procedure in whole or part in their RCS implementation. Had this technical assistance not been available, many utilities would have hired consulting firms to develop ad hoc audit procedures, substantially increasing the total cost of the program.

Sources: U.S. Department of Energy, Residential Conservation Service Model Audit, February 1980; U.S. Department of Energy, Residential Conservation Service Auditor Training Manual, August 1980.

THE ANNUAL CYCLE ENERGY SYSTEM: FEDERAL R&D AS AN INSURANCE POLICY

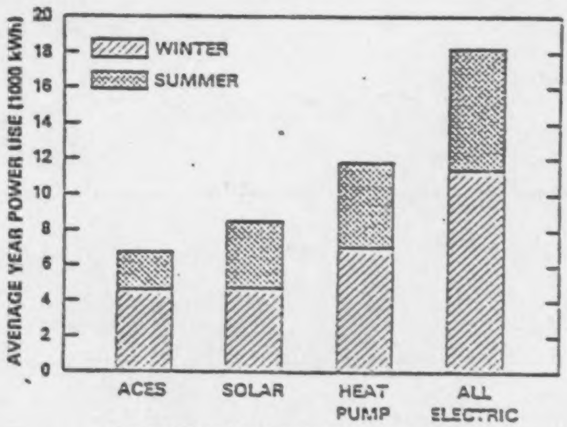
The Annual Cycle Energy System (ACES) has been under development by DOE since 1975. ACES provides space heating, air conditioning, and water heating for residences and commercial buildings. An electric heat pump extracts energy from water stored in an underground tank during the winter. As energy is extracted, the water freezes; the stored ice provides summer air conditioning. Thus, the system yields the energy efficiency of heat pumps plus the inter-seasonal storage of the underground water/ice tank.

ACES yields two important benefits. First, it uses much less energy for heating, water heating, and air conditioning than do conventional systems. For example, field tests near Knoxville, Tennessee showed that the house with ACES used 60% less energy than did a conventional all-electric house, 40% less than did a house with a conventional heat pump, and 20% less than did a solar-heated house. Second, the energy storage capacity of the water/ice tank substantially reduces peak demands for electric utilities in both winter and summer. In particular, ice for air conditioning can be made and stored at night (during off-peak periods) during the summer.

However, ACES is exceeded only by active solar systems in the initial costs for procurement and installation. Because of its large energy savings, ACES operating costs are low and over the lifetime of the system ACES may be economically competitive with conventional alternatives at electricity prices higher than about 5 ¢/kWh. Because most homeowners are strongly influenced by initial purchase price, ACES is not likely to be widely installed under present conditions. As additional DOE research reduces the initial cost of ACES, as electricity prices increase, and as electricity rate structures more closely reflect electricity costs (in particular time-of-day rates), ACES will become increasingly attractive.

Therefore, DOE's investment in ACES can be viewed as an insurance policy. Under present economic conditions, ACES will not save much energy; therefore, private firms are unlikely to invest in the R&D needed to develop ACES. However, when prices increase and rate structures are modified, ACES will be readily available for "off-the-shelf" adoption by private builders. At that time, the very high-efficiency characteristics of ACES will be quite important.

Source: R. E. Minturn et al., ACES 1979 Capabilities and Potential, Oak Ridge National Laboratory, ORNL/CON-48, June 1980.



ENERGY USE BY FOUR SYSTEMS IN 1200 ft^2 KNOXVILLE HOUSE

I-10

TVA'S HOME INSULATION PROGRAM

The Tennessee Valley Authority (TVA) began its Home Insulation Program (HIP) in 1977. The program provides free onsite inspections of residential dwellings and no-interest loans to finance approved weatherization measures; the loan is repaid on a monthly basis through the customer's electric bill. After weatherization measures are installed (either by an approved contractor or by the household), the TVA energy advisor inspects the work to make sure that it meets TVA's specifications.

An independent evaluation of the HIP was conducted in 1980. The evaluation team obtained monthly electricity consumption records for a sample of homes that participated in the initial phase of the program. These households had all obtained loans to install attic insulation in their homes. Electricity use data were available for each home from October 1976 through May 1979, a period long enough to provide a full heating season before retrofit plus a full heating season after retrofit. In addition, data were collected on heating and cooling degree days for each utility district.

These data were used in a detailed statistical analysis. The results of that analysis demonstrated that participating households cut their electricity consumption for space heating by an average of 2200 kWh, a 20% reduction. Use of electricity for air conditioning was cut by an average of 500 kWh, a 15% reduction. Thus, the typical participating household cut consumption by about 2700 kWh because of the TVA program. The average investment (about $300 per participant) is repaid within four years through reduced electricity bills. As electricity prices continue to rise, this payback period gets shorter and shorter.

Based on this evaluation, TVA estimates that the HIP will save 2.5 billion kWh in 1987 and defer the need for more than 1000 MW of new power plants. From the perspective of TVA and its ratepayers in general, the HIP is an attractive program because the cost of conserved electricity is only about half the cost of constructing new power plants. Thus, the program will help TVA hold down electricity rates for all its customers.

These very positive results suggest that the home energy services now offered by utilities throughout the country, as part of the federal Residential Conservation Service, will yield benefits both to program participants and to society in general. Participants receive services that help them cut their fuel bills. Society (utility ratepayers in this case) benefits because the cost of conserved energy is less than the cost of increasing supplies (e.g., new power plants).

Sources: D. G. Czenne and R. A. F. Reisner, The TVA Home Insulation Program: An Evaluation of Early Program Impact, ICF, Inc., prepared for the Tennessee Valley Authority, April 1980; Division of Energy Conservation and Rates, Program Summary, Tennessee Valley Authority, October 1980.

I - 11

IMPROVING U.S. ENERGY PRODUCTIVITY: THE LEAST-COST STRATEGY

To what extent are energy efficiency improvements occurring naturally through the normal workings of the market system? Is government intervention needed to hasten the adjustment to higher fuel prices?

These are crucial questions in the debates about the proper role of government in improving energy efficiency. Unfortunately, they are also difficult questions to answer unambiguously. A group at the Energy Productivity Center developed a novel and useful way of looking at energy consumption that sheds some light on these questions. The Center focused on energy services (such as warmth, light, and mobility) rather than on the fuels themselves. After all, society's demands are for the services that energy resources provide rather than for the raw fuels.

The Center developed a "least-cost energy strategy" for 1978 that compared the actual pattern of energy consumption with the mix of fuels and capital that would have occurred had society been minimizing long-run costs. The levels of energy services (e.g., vehicle miles traveled, thermostat settings in homes and commercial buildings) were kept the same in both cases. The second case differs from the first in that it assumes that the nation's capital stock is hypothetically reconfigured to be optimal for 1978 fuel prices.

The results are interesting and dramatic. The nation actually consumed 79 Quads in 1978, of which 36 Quads was oil. In the least-cost case, on the other hand, total fuel consumption is cut by almost 20 Quads, a 25% reduction. Perhaps more important, oil consumption is cut by almost 11 Quads, a 30% reduction.

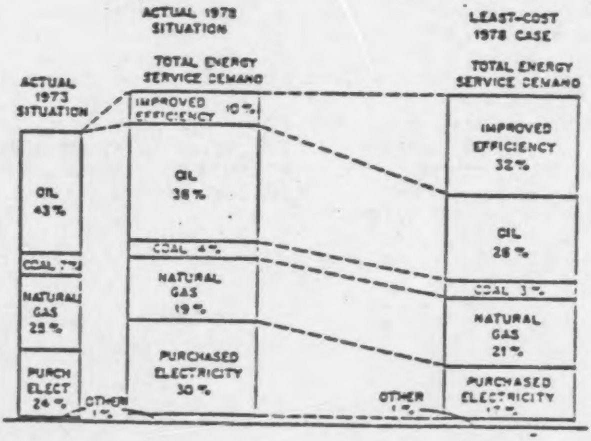
In addition to these savings in energy and petroleum, the total cost to society of energy services (cost of fuels plus capital) is 17% lower in the least-cost case than in the actual 1978 situation. In other words, society reduces energy use by almost a third and energy consumers save money. Of course, this does not mean that the average consumer should immediately scrap existing capital for more efficient equipment. The cost would be too great and probably not economically justified. The "least-cost" example merely illustrates how far from equilibrium our capital stocks are.

The Center recently updated their analysis to 1980. Even though considerable progress was made between 1978 and 1980 in terms of improved efficiency, the least-cost strategy again showed dramatic benefits. In particular, the least-cost strategy led to a 50% reduction in oil use. This potential saving is larger than the 1978 saving because the very sharp increases in oil price were not matched by corresponding efficiency improvements. In other words, it takes a long time to upgrade capital stocks.

These results demonstrate that the market system responds slowly to fuel price increases. They suggest a need for government programs that accelerate the adoption of energy-efficient buildings, equipment, industrial processes, and transportation vehicles. Information and education, research and development, tax credits, and efficiency regulations are all government actions that can move our country more quickly towards a higher level of energy productivity and a lower level of oil imports.

Sources: R. W. Sant, The Least-Cost Energy Strategy, The Energy Productivity Center of the Mellon Institute, 1979; R. W. Sant, "Least-Cost Energy Strategies," Conference Proceedings Utilities and Energy Efficiency: New Opportunities and Risks, Port Chester, New York, U.S. Department of Energy, Conservation, January 1980.

ENERGY SERVICE MARKET SHARES
OF VARIOUS TECHNOLOGIES



APPENDIX II-1

UNITED STATES DEPARTMENT OF ENERGY

memorandum

DATE: March 3, 1981

REPLY ATTN OF:

SUBJECT: Effects of Rescission & Budget Cuts on the BCS Portfolio

TO:

Energy savings estimates and the cost of saving one barrel of oil equivalent have been estimated for BCS program elements. These estimates have been made under the assumption of 100% funding, 50% reduction in funding, and 100% reduction in funding. These estimates were derived using the ORNL and Threshold Models and divisional inputs on project priorities under budget reduction scenarios.

Compared with the ORNL's models used last year, the models have been improved by 1) modifying the manner in which the efficiency of new buildings is calculated, 2) the appliances are retired, and 3) by updating most cost efficiency curves. The model still assumes, however, that if a level of efficient products/structures are demanded, industry will supply what is demanded. Last year, no models were used directly to estimate the energy demand reduction resulting from Community Systems activities. This year the potential for savings was identified through the BNL Reference Energy Systems model and the Systems Analysis Branch base case analysis. ANL District Heating model inputs and Community Systems personnel inputs were also used this year to estimate energy savings for the division. Of course, a new and higher set of energy price projections were used in all model runs.

The results show significant differences between the 1980 and 1981 estimates of energy savings and associated costs per barrel of savings. Cumulative energy savings are lower for three programs, while they are augmented in the remaining four. In general, the cost per barrel of energy savings is substantially lower than indicated by last year's estimates.

The reduction in the dollars per barrel reflects the improvements in the models. These improvements, coupled with the higher energy price streams, have resulted in lower energy demand in the base case. This has made the change in energy demand smaller and at the same time has made the change in private investment proportionally smaller.

The table below shows last year's estimates in savings and $/BBL compared with the full funding case of this year.

	1980 ESTIMATES		1981 ESTIMATES	
PROGRAM ELEMENTS	Quacs	$/BBL	Quacs	$/BBL
Buildings Systems	41.6	7.40	14.8	3.75
Buildings Conservation Services	7.8	24.25	10.2	17.20
Appliance Standards	16.2	9.62	10.9	2.67
Technology & Consumer Products	7.4	1.88	4.3	3.78
Analysis & Technology Transfer	12.6	6.09	15.0	3.06
Community Systems	6.3	7.48	10.0	15.93
Small Business	1.4	10.38	5.5	5.50

Attached are the tables for each level of funding and the energy saving estimates (based on normalized Threshold Runs) for the projects deleted for a 50% reduction. Note also that some energy savings will occur due to past and current BCS activities even if BCS is "zeroed" out.

ENERGY SAVINGS PROJECTIONS FOR BUILDINGS AND COMMUNITY SYSTEMS
BY PROGRAM ELEMENT: BASIC BUDGET

	COST (Billions of 1980 $)			1985			1990			1995			2000			CUMULATIVE TOTAL 1980 - 2000			
	FED	PRIV	TOT EXPEN	Q	MMB	MMBOE	Q	MMB	MMBOE	Q	MMB	MMBOE	Q	MMB	MMBOE	TOT QUADS	ACTUAL OIL	OIL EQUIV	$/B
Building Systems (BEPS)	0.233	9.33	9.56	0.15	4.12	25.8	0.37	7.92	63.6	0.45	10.44	77.4	0.57	11.84	98.04	14.8	180.6	2545.6	3.75
Building Systems (Voluntary BEPS)	.233	7.5	7.7	.09	2.57	15.5	0.23	2.57	39.6	0.27	3.04	46.4	0.35	4.07	60.2	9.0	87.0	1548.0	5.00
Building Conservation Services	0.326	29.8	30.13	0.35	9.54	60.2	0.5	14.5	86.0	0.5	14.5	86.0	0.5	14.5	86.0	10.2	364.3	1754.9	17.2
Appliance Standards	0.050	4.96	5.01	0.03	1.0	5.2	0.3	6.3	51.6	0.43	8.42	74.0	0.47	8.94	80.8	10.9	141.9	1874.8	2.67
Technology and Consumer Products	0.200	2.60	2.80	0.12	5.85	20.6	0.12	5.85	20.6	0.1	5.81	17.2	0.1	5.81	17.2	4.3	173.7	739.6	3.78
Analysis and Technology Transfer	0.049	7.85	7.9	0.12	4.6	20.6	0.3	10.2	51.6	0.44	14.6	75.7	0.56	19.1	96.3	15.0	421.4	2580.0	3.06
Community Systems	.073	27.2	27.4	0.0	0.0	0.0	.33	11.35	56.76	.33	11.35	56.7	.33	11.35	56.7	10.00	255.0	1720.0	15.93
Small Business	.009	5.18	5.19	0.28	2.6	48.2	0.28	2.6	48.2	0.28	2.6	48.2	0.28	2.6	48.2	5.5	104.4	946.0	5.5
TOTAL BCS	0.96	86.92	87.08	0.87	20.16	149.7	1.84	45.59	316.46	2.04	50.21	350.96	2.20	52.14	378.34	53.5	1133.0	9210.6	9.54

APPENDIX III-

Internal DOE Document

SPECIFIC IMPACTS OF FY 1981 RESCISSION AND ZERO BUDGET IN FY 1982
Industrial Energy Conservation

The Reagan budget of $43 million in FY 1981 and $0 in FY 1982 prompted a recent detailed analysis and replanning of the Industrial Program in both years. The analysis was based strictly on the assumption that $43.0 million is the only future funding for the program with FY 1982 and subsequent years without additional budget authority.

As required by prudency, some efforts previously planned for FY 1981 were not begun in order to fund efforts through completion. Costs were estimated for close out of projects also. These costs would be within the $43.0 million of FY 1981 funding.

The specific project impacts have been listed in two categories: those which will be closed out after significant investment but prior to completion of all objectives, and those identified opportunities which will not be started. The following tables summarize the projects in these two categories.

PROJECTS CLOSED OUT PRIOR TO COMPLETION
($000)

WASTE ENERGY REDUCTION	INVESTMENT TO DATE	COST TO COMPLETE	ESTIMATED ANNUAL SAVINGS (QUADS
Reradiant Recuperator	$ 2,322	$ 700	.15
Air Fuel Ratio Controller	766	300	.12
Oxygen Enrichment	845	100	.20
Large Passage Ceramic Recuperator	835	1,400	.12
Water-To-Water Heat Pump	400	3,000	.10
HiCOP Heat Pump	3,325	340	.30
Waste Oil Utilization	3,500	1,000	.16
Waste Fired Brick Kiln	797	1,000	.50
Liquid Fuel From Waste Research	671	500	.50
Energy From Waste Water	461	1,500	.07
SUBTOTAL - WASTE ENERGY REDUCTION	$13,932	$ 9,840	2.22
INDUSTRIAL PROCESS EFFICIENCY			
Coal In Aluminum Remelt	$ 3,740	$ 3,000	.03
Glass Pellet Preheat	600	2,750	.06
Direct Reduction Of Aluminum	4,155	7,500	.70
Inert Anode	820	4,000	.20
Aluminum Cathode	2,400	1,500	.20
Hot Inspection/Steel	2,568	1,072	.30
Freeze Concentration	876	5,000	.05
Foam Processing	658	860	.05
Chemical Separation - Critical Fluid	981	3,000	.40
Sensor Development	675	1,025	.15
Energy Recovery - Dryers	270	736	.06
Cutting Tool Coatings	31	83	.01
SUBTOTAL - INDUSTRIAL PROCESS EFFICIENCY	$17,574	$30,525	2.21
COGENERATION			
Single Stage ORC	$ 2,035	$ 300	—
Coal Fired Brayton Cycle	1,775	8,000	.25
Steam Diesel	595	30,000	.60
Subatmospheric Brayton	3,117	2,000	—
SUBTOTAL - COGENERATION	$ 7,522	$40,300	.85
TOTAL - PROJECTS STOPPED BEFORE COMPLETION	$39,028	$80,666	5.28

PROJECTS WHICH WILL NOT BE STARTED	DOE ESTIMATED POTENTIAL ANNUAL SAVINGS (QUADS)
WASTE ENERGY REDUCTION	
Fluidic Temperature Sensor	.03
District Heating Recuperator	.20
BiPhase Concentrator	.06
Slagging Burner	.20
Chemical Heat Pump	.10
Wood Fired Lumber Dryer	.03
Mobile Tire Pyrolysis	.04
Comminution And Blasting	.02
Liquid Fuel From Waste Pilot	.07
Fluidized Bed Waste Heat Boiler (1 Project)	.20
High Temperature Burner Duct Recuperator (1 Project)	.30
SUBTOTAL - WASTE ENERGY REDUCTION	1.25
INDUSTRIAL PROCESS EFFICIENCY	
Cement Particle Size Control	.10
Coke Pellet Process	—
Formcoke Process	—
Advanced Copper Smelting	.01
Hydropyrolysis - Chemical Burning	.20
Efficient Motor Development	.20
Computer Controls - Manufacturing	.15
Advanced Catalytic Reactor	.50
Methane Transport	.50
Dessicant Lumber Drying	.01
New Pulp Process	.08
Energy Integrated Farms (3 Projects)	.01
Citrus Process Development	.04
Mechanical Vapor Recompression	.06
Energy Conservation Meat And Dairy	.03
Crop Drying System Demonstration	.03
Vegetable Oil Continuous Process	.03
SUBTOTAL - INDUSTRIAL PROCESS EFFICIENCY	1.95
COGENERATION	
Brayton Topping System (2 Projects)	.25
Large Bottoming Cycle	.01
Thermionic Topping	.09
SUBTOTAL - COGENERATION	.35
IMPLEMENTATION AND DEPLOYMENT	
EADC (10 Universities)	.01
Industrial Workshops	.01
Technology Implementation Programs	—
SUBTOTAL - IMPLEMENTATION AND DEPLOYMENT	.02
TOTAL - PROJECTS WHICH WILL NOT BE STARTED	3.57

ENERGY CONSERVATION COALITION

ENERGY CONSERVATION COALITION'S
PROPOSAL FOR ALLOCATING THE RECONCILIATION BUDGET
FOR FEDERAL ENERGY CONSERVATION PROGRAMS
FY 1983

NOTE: The funding levels proposed in this budget have been seriously constrained by adhering to the limits authorized by Congress in the Omnibus Budget Reconciliation Act of 1981. The reader is cautioned not to conclude that these funding levels are the highest that would be justified if a rational energy policy were fully pursued. Moreover, any sudden or dramatic acceleration of current energy prices will almost certainly necessitate significant funding increases, particularly for programs like the low-income weatherization program and the Solar and Conservation Bank which are specifically designed to enable low and moderate income families adjust to higher energy prices by installing new efficiency measures.

1725 I Street, Northwest, Suite 601, Washington, D.C. 20006 (202) 466-6045

Conservation Foundation • Environmental Action • Environmental Defense Fund • Environmental Policy Institute • Federation of American Scientists • Friends of the Earth • League of Women Voters of the United States • National Audubon Society • National Consumer Law Center • National Consumers League • Natural Resources Defense Council • National Wildlife Federation • Sierra Club • Solar Lobby • Union of Concerned Scientists

January 1982

SUMMARY OF PROPOSED FEDERAL ENERGY CONSERVATION BUDGET FOR FY 1983 [a]

(in millions)

DEPARTMENT OF ENERGY	fy 82 Appropriation	fy 83 Reagan	fy 83 Reconciliation 1/	fy 83 Proposed
Buildings and Community Systems	47.7	0.0	81.8	78.8
Industrial Energy Conservation	28.8	0.0	33.9	42.7
Transportation En. Conservation	58.9	0.0	68.0	43.0
State and Local	234.2	4.3	370.3	393.0
Multisector	16.5	17.5	21.1	17.5
DOE Subtotal	386.1	21.8	575.1	575.1
DEPARTMENT OF HOUSING AND URBAN DEVEL.				
Solar and En. Conservation Bank	23.0	0.0	50.0	100.0
HUD Subtotal	23.0	0.0	50.0	100.0
TOTAL	409.1	21.8	625.1	675.1

1/ Derived by adjusting each program upwards by the same proportional increase approved by Congress in Reconciliation

Highlights:

- Proposed DOE budget has been held within the $575 million in BA that Congress approved during Reconciliation
- DOE priorities would be shifted to provide a more balanced approach to overcoming the full range of barriers to a more effective market:

PERCENT OF TOTAL

	fy 82 Appropriation	Proposed for fy 83
BUILDINGS & CS	12.4	13.7
INDUSTRIAL	7.5	7.4
TRANSPORTATION	15.3	7.5
STATE/LOCAL	60.2	68.3
MULTISECTOR	4.3	3.1
	100.0	100.0

- 70 percent increase in State/Local, including $220 million for low-income weatherization
- $100 million to leverage loans from the Solar and Energy Conservation Bank to middle and lower-income households
- Total federal energy conservation budget is still only at the same level as fy 81 post-rescission budget
- Still 37 percent below the fy 81 pre-rescission budget

[a] Prepared by David Moulton of the Energy Conservation Coalition (466-5045) and Debbie Blaviss of the Federation of American Scientists (546-3300)

Department of Energy

PROGRAM: Buildings and Community Systems

	(in millions)		
	FY 82	FY 83	
SUBPROGRAMS	Appropri-ation	Reconcili-ation	Propose
A) Building Systems Projects to include: 1) Applied research in new and old buildings. * 2) Development of building performance guidelines, including energy labeling, with manuals and support to states on both labels and voluntary standards. 3) Evaluation of new construction practices and the existing building stock and its rate of retrofit. * 4) Grants for demonstrations of energy conservation delivery systems, especially for rental housing.	18.6	24.8 +	27.0
B) Residential Conservation Service (RCS) Projects to include: 1) Evaluation of and technical assistance with state RCS programs. 2) Monitoring of utility supply, installation, and financing activities. * 3) Preparation and development of the Commercial and Apartment Conservation Service program (CACS). * 4) Grants for training and certification of energy auditors.	3.4	+	10.2
C) Community Systems Projects to include: 1) Cogeneration and district heating applications to communities. * 2) Community outreach. * 3) Community energy management planning.	3.8	4.6	4.0
D) Small Business Projects to include: * 1) Evaluation of technologies applicable to small businesses which will reduce energy use. * 2) Outreach to small businesses to reduce energy use.	0.0	0.0	1.0

+ indicates that this subprogram was expected to receive an additional, unspecified amount out of $27.1 million in new BA in 1982 provided by the Reconciliation Act for B & CS and TSU. (We assumed an allocation of 3.3 to TSU, and have adjusted upwards proportionately for FY 83.)

(B & CS cont.)

Department of Energy

PROGRAM: Buildings and Community Systems (cont.)

	(in millions)		
	FY 82	FY 83	
SUBPROGRAMS	Appropri-ation	Reconcil-iation	Proposed
E) Technology and Consumer Products Projects to include: 1) Research and development support for new heating and cooling (e.g. heat pumps), lighting, and commercial appliance systems. 2) Evaluation and testing of new energy-conserving technologies brought into the market.	10.6	11.5	16.2
F) Appliance Standards Projects to include: 1) Development of test procedures for FTC appliance labeling. * 2) Development of appliance efficiency standards.	1.6	+	4.0
G) Analysis and Technology Transfer Projects to include: * 1) Evaluation of the performance of BCS programs. * 2) Development of a data and information system to support the BCS programs.	1.0	2.1	4.0
H) Federal Energy Management Program Projects to include: 1) Updating of guidelines to improve the energy efficiency of federal operations with backing from research in the various conservation programs. 2) Dissemination of energy information to all federal agencies.	.5	0.0	2.0
I) Municipal Waste/Urban Waste Projects to include: 1) Research, development, and demonstration of energy from waste technologies. * 2) Integration of energy recovery and materials recovery (e.g. recycling) systems to reduce energy waste.	4.8	6.9	7.0
J) Program Direction	3.4	6.7	3.4
SUBTOTAL	47.7	56.2	75.8
		- 25.6	
TOTAL	47.7	31.8	75.8

Department of Energy

PROGRAM: Industrial Energy Conservation

SUBPROGRAMS	(in millions) FY 82 Appropriation	FY 83 Reconciliation	 Propose
A) Waste Energy Reduction Projects to include: Research and development support for long term waste energy reduction technologies and systems.	11.9	13.1	15.0
B) Industrial Process Efficiency Projects to include: Research and development spport for long term process efficiency technologies.	7.7	8.5	15.0
C) Industrial Cogeneration Projects to include: Research and development support for long term cogeneration technologies.	2.3	5.5	5.0
D) Implementation and Deployment Projects to include: 1) Support for the six Energy Analysis and Diagnostic Centers. * 2) Analysis of the market potential in industry for the new energy-conserving technologies now being developed. * 3) Dissemination of information on new processes and technologies through technical reports and seminars. * 4) Analysis of the effectiveness of the Industrial Energy Conservation program.	4.8	4.2	5.5
E) Program Direction	2.1	2.6	2.2
TOTAL	28.8	33.9	42.7

Department of Energy

PROGRAM: Transportation Energy Conservation

	(in millions)		
	FY 82	FY 83	
SUBPROGRAMS	Appropri-ation	Reconcili-ation	Propose
A) Vehicle Propulsion	33.5	36.7	15.0
Projects to include:			
* 1) A cooperative research program with auto manufacturers on direct injection stratified charge and diesel engines, advanced-transmissions, lubricants, and tires.			
2) Basic research on advanced Stirling and Brayton engines.			
B) Electric and Hybrid Vehicle R&D	18.8	20.7	10.0
Projects to include:			
Research on advanced battery systems			
C) Transportation Systems Utilization	.1	3.5	8.0
Projects to include:			
* 1) Outreach on Low Cost/No Cost motor vehicle conservation activities.			
* 2) Dissemination of information on the potential for consumers to increase the gas mileage of new car fleets (e.g., the Gas Mileage Guide).			
* 3) Research support and outreach for new technologies designed to increase the energy efficiences of rail, marine, air, and pipeline transportation.			
D) Alternative Fuels Utilization	4.0	5.5	8.0
Projects to include:			
* Development of methanol- and ethanol-propelled vehicles.			
E) Program Direction	1.7	1.7	2.0
TOTAL	58.9	68.0	43.0

Department of Energy

PROGRAM: State and Local

SUBPROGRAMS	(in millions) FY 82 Appropriation	FY 83 Reconciliation	FY 83 Proposed
A) Schools and Hospitals Grants Program	48.0	354.5	110.0
Projects to include:			
Retrofit of about 2000 school or hospital buildings.			
B) Weatherization Assistance Program	144.0		220.0
Projects to include:			
Retrofit of about 200,000 low income homes.			
C) State Energy Conservation Grants	24.0		30.0
Projects to include:			
1) Support for state energy offices. 2) State development of energy management programs.			
D) Emergency Energy Conservation Planning	1.9		10.0
E) Energy Extension Service	9.6	15.8	15.0
F) Program Direction	6.7	-	8.0
TOTAL	234.2	370.3	393.0

Department of Energy

PROGRAM: Multisector

	(in millions)		
	FY 82	FY 83	
SUBPROGRAMS	Appropriation	Reconciliation	Propose
A) Appropriate Technology	2.9	5.3	5.0
Projects to include:			
Grants to make use of community-based, energy-related technologies that conserve non-renewable resources.			
B) Invention Program	5.2	5.7	4.0
Projects to include:			
Support to inventors for energy-conserving inventions.			
C) Energy Conversion and Utilization Technology	7.8	9.7	8.0
Projects to include:			
Support for long term research and development for increasing energy productivity.			
D) Personnel Resources	.6	.4	.6
TOTAL	16.5	21.1	17.6

Department of Housing and Urban Development

PROGRAM: Solar Energy and Energy Conservation Bank

	(in millions) FY 82	FY 83	
	Appropriation	Reconciliation	Proposed
Stimulus to retrofit 85,000 homes, reducing energy use by an average of 25 percent and saving an estimated 9 million barrels of oil equivalent over the life of these investments.	23.0	50.0	100.0

---

* Indicates an activity that should be implemented but presently does not exist. (Such an activity may either be completely new or it may have previously existed but has subsequently been eliminated).

ENERGY CONSERVATION: THE ROAD TO NEW GROWTH IN AN ERA OF UNCERTAIN SUPPLY

Introduction

On October 20, 1973, Saudi Arabia announced a total boycott of all petroleum exports to the United States in response to the sale of U.S. arms to Israel. This event severely damaged the U.S. economy and ushered in an era of high-priced, insecure energy. On this eighth anniversary of that first oil shock, the Energy Conservation Coalition has reviewed the current status of energy supply and demand and its relationship to new growth. The conclusions of that review are contained in this report, which we are issuing today both as a reminder of our continuing vulnerability to crippling oil shocks from abroad and as solid evidence of the progress made possible by energy conservation. As the report shows, energy conservation is largely responsible for enabling the United States to increase its Gross National Product since 1973 without increasing its dependence on foreign oil. In fact, energy conservation has met 88 percent of the requirements of new growth since 1973, while energy supply accounts for only 12 percent of the requirements. This fact, not often heralded by energy analysts or policymakers, needs to be emphasized, since energy policy has frequently been fashioned on the assumption that energy conservation and new growth are incompatible.

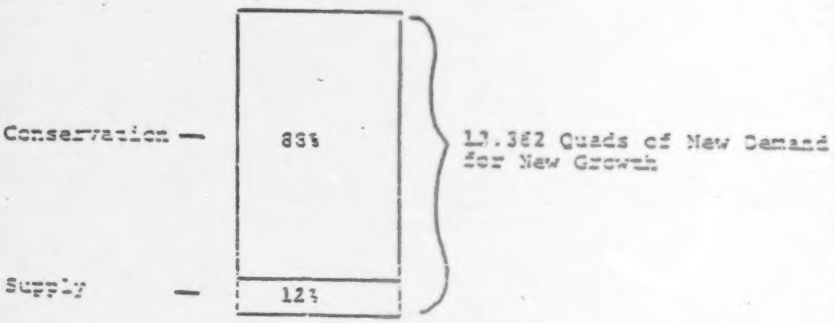
Figure 1 summarizes the findings of this report, showing the relative contributions of conservation and supply to meeting the energy demand for new growth since 1973.

FIGURE 1

Meeting the Energy Demand for New Growth

1973 - 1980

(quadrillion BTU)



Analysis

Although the American economy is not well, its resilience in an era of oil price shocks has been surprising. Despite extremely disruptive oil shocks--first in 1973, when the Arab members of OPEC boycotted exports to the United States, and then in 1979, when revolutionary forces interrupted oil exports from Iran--the U.S. economy has managed to grow. Correcting for inflation, our Gross National Product has increased by 13 percent.

Prior to 1973, such growth in our GNP meant rising energy consumption in amounts roughly proportional to that growth. From 1960 through 1973, both GNP and energy consumption rose approximately 70 percent. This led to the widespread assumption that new growth necessarily required an increase in energy supplies to meet new consumption.

Fortunately, this assumption was wrong. In fact, in the seven years following the first run-up in OPEC oil prices, growth has continued while total energy consumption has remained virtually unchanged.

Eighteen percent economic growth has occurred with just a two percent increase in consumption--an unprecedented rupture in the pre-1973 relationship of growth and consumption. (Table 1).

TABLE 1

	GNP (trillion 1972 dollars)	Energy Consumption (quadrillion BTU)
1973 Average	1.255	74.609
1980 Average	1.481	76.201
Change	+ 13%	+ 2%

Source: Department of Energy, Monthly Energy Review

How did this happen? In a million ways, and in one way. In a million ways, Americans have learned, or in some cases been forced, to get more work out of each unit of energy. More efficient cars, industrial processes, electric motors, buildings, are

are examples of a changing capital stock that permit growth to continue but at lower rates of energy consumption. In one way, this can be summarized in a useful index--energy consumption per GNP dollar (Table 2).

TABLE 2
Energy Consumption per GNP Dollar
(thousand BTU/1972 constant dollar)

1973 Average	59.4	
1980 Average	51.5	-13 percent

Source: Department of Energy, Monthly Energy Review

As this index shows, the American economy now takes 13 percent less energy to generate a constant dollar of GNP. While some of that improvement has come at a real cost, most of it can fairly be attributed to increased efficiency that has permitted a high standard of living and new growth without sacrificing long-term comfort or convenience.

This "efficiency index" (energy consumption/GNP dollar) makes it possible to calculate the total new energy resources that we required in 1980 to generate an 18 percent improvement in GNP since 1973 (Table 3).

TABLE 3
Energy Resources for New Growth
1973 - 1980
(quadrillion BTU)

1980 Consumption assuming unimproved (1973) efficiency a/	87.971
1973 Consumption	74.609
Total resources required	-13.362

1/ (1980 GNP) x (1973 Energy Consumption per GNP dollar)

In 1980, we would have required 13.362 new quads of energy supply to generate $1.481 (1972 dollars) of GNP at 1973's rate of efficiency. In other words, if the United States had relied solely on new supplies to generate new GNP, our supply requirements would have grown by over 13 quads. Our two major sources of new supply are new production and foreign imports. Since 1973, new production had been disappointing despite substantial real increases in energy prices. Foreign imports, meanwhile, after rising through the mid-70's, have now settled back at a level almost equivalent to the level of October, 1973, when the Arab members of OPEC first exploited our vulnerability. Overall, new supplies made only a minor 1.592 quad contribution to meeting the demand for new resources to support new growth since 1973 (Table 4A).

TABLE 4A
Meeting the Demand: Resources for New Growth
Supply 1973-1980
(quadrillion BTU)

	1973	1980	
U.S. production	62.433	64.748	+2.315
Imports (net)	12.659	12.074	-0.585
Stock changes			-0.138
Total new supply			+1.592

Source: Department of Energy, Monthly Energy Review

In stark contrast, energy conservation has made an overwhelming contribution to meeting the demand for new resources to support new growth. Of the total increment of 13.362 quads, 11.770 quads are attributable to energy conservation (Table 4B).

TABLE 4B
Meeting the Demand: Resources for New Growth
Conservation 1973-1980
(quadrillion BTU)

1980 Consumption assuming unimproved (1973) efficiency 1/	87.971
1980 Consumption	76.201
Total new conservation	+11.770

1/ (1980 GNP) x (1973 energy consumption per GNP dollar)

The relative contribution of supply and conservation to meeting the energy requirements of new growth are summarized below (Table 4C).

TABLE 4C
Meeting the Demand: Resources for New Growth
Summary 1973 - 1980
(quadrillion BTU)

Total resources required	13.362	
Supply	1.592	12%
Conservation	11.770	88%

Implications for the Future

The findings made above are startling only in the magnitude of conservation's contribution. It has been obvious for years that enormous opportunities for generating new growth from less energy would be possible as inefficient machines were replaced. However, despite the progress to date, our dependence on foreign oil imports has not lessened appreciably since 1973. Our dependence on Saudi Arabia moreover, has actually doubled from a 1973 average of 486 thousand barrels of oil per day to 1.2 million barrels in 1980.

Therefore, it is important to stress that the potential for energy conservation as the primary source of new growth has hardly been tapped. The most recent comprehensive analysis of this potential concluded that between 1977 and the year 2000, the Gross National Product could increase by 80 percent if policies are adopted to accelerate the current pace of energy conservation.1/ Moreover, this new conservation will permit us not only to increase growth, but to reduce current energy use and eliminate oil imports.2/ The potential for reducing end-use demand identified in that report is summarized in Table 5.

TABLE 5
End-use Energy Demand Potential
(quadrillion BTU)

	Current (1977)	Potential (2000)
Residential buildings	16.2	11.0
Commercial buildings	10.4	7.3
Industry	29.1	29.4
Agriculture	1.6	1.7
Transportation	19.4	13.3 - 17.4
	76.7	62.7 - 66.8

Source: SERI Report

Conclusion

The GNP of the United States has continued to grow even in the post-embargo era of insecure energy and energy price-inflation. This has been possible primarily as a result of energy conservation that has decreased the amount of energy needed to generate a new burst of growth. In fact, the post-embargo era reveals an emerging and dominant relationship--growth and energy conservation. Public and private policies for coping with an unhealthy economy and foreign energy imports would appear to be best directed at promoting energy conservation. Its maximum economic potential offers a promising road to new growth.

1/ Unofficial report of the Solar Energy Research Institute (SERI), A New Prosperity: Building a Sustainable Future, Brick House, Publishing (Andover, Mass. 1981)

2/ Ibid.

Conservation and Solar Energy R&D Expenditures: An International Comparison

Prepared for:
Office of Policy, Planning, and Evaluation
Office of Conservation and Renewable Energy
U.S. Department of Energy

Prepared by:
DHR, Incorporated

DOE Contract No. DE-AC01-81CE10097
DHR Contract No. C5133-1

November 9, 1981

dhr
dhr, incorporated 1055 Thomas Jefferson St., N.W., Suite 414, Washington, D.C. 20007 (202) 342-5400

PREFACE

This report was prepared by DHR, Incorporated, in October and November, 1981. Mr. James Corr, Senior Associate, led the DHR research team which conducted the analysis. Membership included Ms. Sherri Hayes, Ms. Michelle O'Donnell, Ms. Karen Robertson, Mr. Joel Rosen, and Mr. Stephen Herzenberg. The authors wish to thank Dr. James Just of DHR who provided review comments and the staff of the DOE Office of Policy, Planning and Evaluation, particularly Dr. Michael Power and Dr. Gurmukh Gill, for their overall assistance in the formulation of the report.

EXECUTIVE SUMMARY

- In absolute terms, the United States has spent more public funds in recent years on both conservation and solar RD&D than any of the countries surveyed (Tables 1 and 2).
- The U.S. private sector (in 1980) was the leader in conservation R&D spending, and a close second to Japan in solar (Tables 6 and 7).
- However, when weighted by energy consumption, the U.S. slips to at best a medium ranking in R&D spending in both the public and private sectors, though it performs better in per capita spending and the ratio of R&D spending to GDP (Tables 3, 4 and 5).
- These conclusions are based on data up to 1981; the effect of the planned U.S. Federal conservation and solar budget will be to place the U.S. at the bottom of the international "league" in weighted terms and possibly behind other smaller countries even in absolute terms.
- There is little evidence that other countries are planning to cut back their conservation and solar programs in a similar fashion; several (notably France, Sweden, and Japan) are planning significantly increased efforts.
- Further research is required to determine to what extent the U.S. private sector will "pick up the slack" created by the reduction in Federal R&D spending in conservation and solar energy.
- A large portion of foreign R&D is cost-shared with the aim of getting technologies into the marketplace as rapidly as possible; only a relatively small amount of funding is allocated through competitive solicitation.
- A greater emphasis is placed in foreign countries on developing technologies specifically for export or in encouraging conservation in industries that must compete in the international market.
- Several foreign countries have specific research programs, especially in conservation, less so in solar, from which the U.S. could benefit considerably; these inculde the Swedish, German, Japanese and British industrial conservation programs, the Swedish and German district heating programs, and some solar programs in Germany, Sweden, Japan and the United Kingdom.
- Highlights of the R,D&D programs in the individual countries follow;

SWEDEN

- The Swedish government spent $79 million on conservation and solar RD&D in 1980 (62.6% of the total energy research budget). Both conservation and solar will be allocated a larger percentage in the next 3 years, despite a general effort to trim the federal budget.
- Swedish energy RD&D encompasses a broad range of activities from long-term, high risk R&D to demonstration, information transfer and commercialization. Most projects are funded entirely by the government; demonstration and conservation equipment purchase are supported through low interest loans and subsidies.
- Most conservation and solar R&D is aimed at the industrial and buildings sectors. In the industrial sector, research concentrates on improving the energy efficiency of manufacturing processes, e.g., iron and steel production, wood/pulp/paper processing.
- In the building sector, the three principal research areas are storage, heat pumps, and solar heating technology. For example, full-scale pilot testing of underground and aqueous seasonal storage technologies is being undertaken. Also, the expansion of district heating at 1000 GW per year during the 1980's is being promoted.
- Sweden actively supports research on solar heating and cooling, wind energy, biomass, and many specific conservation technologies, with little emphasis on photovoltaic, geothermal, and ocean energy.

JAPAN

- In 1980, the Japanese government spent at least $89 million on renewable energy R,D&D and $32 million on conservation research.
- The geothermal R,D&D program was funded at $40-50 million in 1980.
- The solar R,D&D program includes flat plate and concentrating collectors, photovoltaics, and solar thermal technologies.
- Ocean thermal and hydrogen energy are the other renewable technologies funded--wind and biomass receive very little support.
- Private solar R,D&D expenditures were $60 million--higher than any other country surveyed. Exploitation of the international market for solar technologies is just beginning; until now, emphasis was on the domestic market.
- The emphasis of the government's conservation R,D&D program is on energy-intensive industries. Industrial waste heat recovery technologies being researched include heat pipe, heat exchange, heat pump, and related heat recovery materials and design research. Efforts in the buildings, transportation, and utility sectors are also underway.
- Private conservation RD&D spending was surpassed only by the U.S. in 1980 and totalled $337 million.

FEDERAL REPUBLIC OF GERMANY

- In 1980, the German government spent $136 million on conservation and solar RD&D (about half of U.S. spending on a per capita basis); this represents 13% of the total government RD&D budget on energy.

- RD&D activity is focussed on the near-term. Support is almost always cost-shared with industry, and whenever possible, government-funded RD&D is carried out by industry in order to promote rapid commercialization.

- A prime goal of the solar energy program appears to be export of German products. Renewables are not envisioned to play a major role in satisfying domestic energy needs because of unfavorable climatic conditions.

- District heating is an area of particular emphasis in conservation RD&D. The Government has proposed a $520 million program over 5 years to subsidize capital investment in plants designed for the generation and distribution of district heat (mainly coal-fired and refuse-fired plants).

- Photovoltaics received 58% of public solar R&D funds in 1980. Germany seeks to lower the cost of the solar cell generator to less than DM 5/Wpv output (about $2.20) by 1985. Wind energy technologies are also receiving a major portion of government solar support.

- The IEA estimates that $68 million was spent on conservation and solar R&D by the private sector in 1980. However, the German government believes this estimate is too low by a factor of 2.

FRANCE

- In 1980, France spent $322 million on conservation and solar RD&D (about 40% higher than the US in per capita terms); this represents 33.7% of the total government RD&D budget on energy.

- Estimates for 1981 indicate that solar RD&D spending alone will rise by 42% (in francs) over the 1980 level; with plans to increase spending to $380 billion over a 10-year period.

- Government RD&D attaches a priority to aiding commercialization of technologies as well as to their development. Illustrative projects include: demonstration of scrap wood-fire boilers, television broadcasts on energy-saving equipment, and provision of a subsidy for installation of insulating materials in buildings.

- Public RD&D activities also promote penetration of French technology into foreign markets. COMES, which directs the solar program, is expressedly charged with discovering and opening up new markets for French photovoltaic products.

- Spending on solar energy RD&D focuses primarily on geothermal and biomass. The geothermal program concentrates on the development of low temperature geothermal heat; the use of wood as an energy source is stressed in the biomass program.

- Other technologies that are receiving a significant amount of funding include solar-heating-and-cooling and photovoltaics.

CANADA

- Canadian federal R,D&D expenditures for solar and conservation in 1980 were 23% of the energy R,D&D budget and totalled $58.6 million.

- The National Energy Plan calls for the contribution of hydro to the national energy supply to increase to over 27% from 24% and for the contribution of other renewables to increase to 6% from 3% by 1990.

- R,D&D for alcohol, hydrogen and synthetic liquid fuels was budgeted at $20.4 million in FY1981-82.

- Solar heating and cooling was among the most heavily supported areas ($13.5 million). This area is also supported by the private sector, the provincial sector and the Canadian international development sector, reflecting the emphasis on the export potential of the technology.

- The private sector funds about 20% of renewables R,D&D. The majority of conservation R,D&D is privately funded, with 13% of all private energy R,D&D in this area.

- Industrial sector R,D&D programs include voluntary conservation goals set by industrial task forces, energy audits, government-industry seminars and workshops, and subsidies and grants for conservation and use of biomass and alternative fuels.

UNITED KINGDOM

- United Kingdom public R,D&D expenditures for solar and conservation are relatively small--$52.3 million in 1980, 12% of the energy RD&D budget.

- The major focus is on industrial conservation ($26.5 million), 45% of which was privately funded. The program emphasizes audits and development and demonstration of conservation technologies, especially waste heat recovery, in the most energy-intensive industries.

- Buildings sector conservation programs include grants to homeowners for costs of insulating attics and water tanks.

- The renewables R,D&D program focusses on ocean energy conversion, with emphasis on development of more cost-effective technologies for wave energy and tidal power.

- Other renewable technologies for which public sector support has been increasing are geothermal, solar, wind and biomass energy.

- Only 6% of 1980 private energy R,D&D was directed to conservation and solar; conservation funding came to $19.3 million but solar R,D&D totalled only $1.2 million.

TABLE 1

TOTAL FEDERAL GOVERNMENT R&D BUDGET FOR ENERGY CONSERVATION

($ millions)

	1979		1980		1981	
	$	%[1]	$	%[1]	$	%[1]
UNITED KINGDOM	34.7[2]	8.9[2]	27.62[3]	6.25[3]	na	na
WEST GERMANY	45.1[2]	4.3[2]	70.52[3]	6.71[3]	na	na
JAPAN	51.3[2]	5.6[2]	32.04[3]	2.42[3]	61.3[6]	3.9[6]
AUSTRALIA	na	na	2.22[3]	6.11[3]	na	na
CANADA	10.7[4]	7.7[4]	24.38[3]	9.46[3]	13.6[4]	7.9[5]
SWEDEN	34.2[2]	32.0[2]	34.1[3]	27.0[3]	45.7[6]	34.1[6]
NETHERLANDS	14.5[2]	12.9[2]	23.64[3]	15.0[3]	22.3[7]	14.8[7]
FRANCE	80.9[8]	na	92.4[8]	9.7[6]	na	na
UNITED STATES	211.7[2]	5.6[2]	252.80[3]	6.01[3]	211.7[6]	na

[1] As a percentage of total government R&D energy budget.

[2] IEA, Energy Research, Development and Demonstration in the IEA Countries, 1979 Review of National Programmes, 1980.

[3] IEA, Energy Research, Development and Demonstration in the IEA Countries, 1980 Review of National Programmes, 1981.

[4] National Energy Program 1980, Energy, Mines and Resources Canada.

[5] Canadian Embassy.

[6] DHR Estimate.

[7] Dutch Embassy (May include more than just R,D&D).

[8] French Ministry of Industry, Les chiffres cles: Energie 1981, 1981.

TABLE 2

TOTAL FEDERAL GOVERNMENT R&D BUDGET FOR SOLAR (RENEWABLES)

($ millions)

	1979		1980		1981	
	$	%[1]	$	%[1]	$	%[1]
UNITED KINGDOM	19.1[2]	4.9[2]	24.7[3]	5.60[3]	na	na
WEST GERMANY	46.4[2,4]	4.4[2]	65.7[4]	6.26[3]	na	na
JAPAN	38.5[2]	4.2[2]	88.82[3]	6.71[3]	96.7[6]	6.12[6]
AUSTRALIA	na	na	5.21[3]	14.32[3]	9.7[5]	na
CANADA	18.5[2]	13.3[2]	34.30[3]	13.31[3]	na	na
SWEDEN	32.0[2]	30.0[2]	44.9[3]	35.58[3]	50.7[6]	37.8 [6]
NETHERLANDS	10.0[2]	9.0[2]	18.06[3]	11.47[3]	16.5[7]	11.0 [7]
FRANCE	na	na	230[5]	24.2[5]	255[5]	na
UNITED STATES	624.2[2]	16.5[2]	731.20[3]	17.39[3]	607.3[6]	na

[1] As a percentage of total government R&D energy Budget.

[2] International Energy Agency, Energy Research, Development and Demonstration in the IEA Countries, 1979, Review of National Programmes, 1980.

[3] International Energy Agency, Energy Research, Development and Demonstration in the IEA Countries, 1980 Review of National Programmes, 1981.

[4] Government Accounting Office, Industry Views on the Ability of the United States Photovoltaics Industry to Compete in Foreign Markets, September 15, 1981.

[5] French Ministry of Industry, Les Chiffres Cles: Energie 1981, 1981.

[6] DHR Estimate

[7] Dutch Embassy (may include more than just R,D&D).

[8] La Politique Solaire de la France, Based on 1981 current exchange rate.

TABLE 3

TOTAL FEDERAL GOVERNMENT R&D BUDGET FOR ENERGY CONSERVATION PER UNIT PRIMARY ENERGY CONSUMPTION[1]

(In millions $/quad)

	1979		1980		1981	
	m$	m$/quad	m$	m$/quad	m$	m$/quad
United Kingdom	34.7	3.65	27.52	2.89	n.a.	n.a.
West Germany	45.1	3.66	70.52	5.68	n.a.	n.a.
Japan	51.3	3.22	32.04[2]	1.90	61.3	3.44
Australia	n.a.	n.a.	2.22	0.61	n.a.	n.a.
Canada	10.7	1.12	24.38	2.46	13.6	1.32
Sweden	34.2	15.69	34.1	15.49	45.7	20.56
Netherlands	14.5	4.89	23.64	7.79	22.3	7.19
France	80.9	9.91	92.4	11.17	n.a.	n.a.
United States	211.7	2.62	252.8	3.10	211.7	2.57

---

[1] SOURCE: DHR estimates based on IEA energy budget data (see later tables) and IEA energy consumption data.

[2] Probably an underestimate; see footnote, page J-1

TABLE 4

FEDERAL SOLAR AND CONSERVATION R&D BUDGET PER CAPITA[1]

	1979	1980	1981
United Kingdom	0.96[2]	0.94[3]	n.a.
West Germany	1.50[2]	2.24[3]	n.a.
Japan	0.78[2]	1.04[3]	1.35[4]
Australia	n.a.	0.51[3]	n.a.
Canada	1.23[2]	2.44[3]	n.a.
Sweden	8.02[2]	9.57[3]	11.66[4]
Netherlands	1.75[2]	2.96[3]	2.74[5]
France	n.a.	6.08[4]	4.81[6]
United States	3.79[2]	4.43[3]	3.65[4]

---

[1] Based on population estimates for 1979, 1980, and 1981 from World Population Trends and Prospects by Country, 1950-2000, United Nations, 1979.

[2] IEA, Energy Research, Development and Demonstration in the IEA Countries, 1979 Review, 1980.

[3] IEA, Energy Research, Development and Demonstration in the IEA Countries, 1980 Review, 1981.

[4] DHR estimate.

[5] Based on Dutch embassy figures.

[6] Renewables alone.

TABLE 5

RATIO OF FEDERAL SOLAR AND CONSERVATION R&D BUDGET TO GDP

(per mille)

	1979	1980	1981[1]
United Kingdom	0.14[2]	0.21[3]	n.a.
West Germany	0.12[2]	0.27[3]	n.a.
Japan	0.09[2]	0.18[3]	0.247[4]
Australia	n.a.	0.07[3]	n.a.
Canada	0.13[2]	0.30[3]	n.a.
Sweden	0.65[2]	1.03[3]	1.26[4]
Netherlands	0.16[2]	0.44[3]	0.41[5]
France	n.a.	0.81[4]	0.64[6]
United States	0.36[2]	0.54[3]	0.45[4]

---

[1] Based on 1980 GDP, SOURCE: OECD Main Economic Indicators.

[2] IEA, *Energy Research, Development and Demonstration in IEA Countries, 1979 Review*, 1980.

[3] IEA, *Energy Research, Development and Demonstration in IEA Countries, 1980 Review* 1981.

[4] DHR estimate.

[5] Dutch embassy figures.

[6] DHR estimate, renewables alone.

TABLE 6

PRIVATE RD&D SPENDING FOR SOLAR AND CONSERVATION IN 1980

($ millions)

	Conservation	Solar
WEST GERMANY	35.31[1]	32.95[1]
JAPAN	336.59	59.64
NETHERLANDS	19.27	6.54
UNITED KINGDOM	19.28[2]	1.16
UNITED STATES	476.2	41.60

[1] This figure includes only the industry share of public/private cost-shared ventures. Exclusively private investment, which is considerable, has not been estimated by the IEA.

[2] This includes only spending by the nationalized British industries.

TABLE 7[1]

PRIVATE INDUSTRY CONSERVATION RD&D SPENDING PER UNIT OF PRIMARY ENERGY CONSUMPTION IN 1980

($ million/quad)

West Germany	2.82[2]
Japan	18.87
Netherlands	6.21
United Kingdom	2.01[3]
United States	5.78

[1] SOURCE: Table 6 and IEA figures for total primary energy consumption

[2] Based on private share of cost-shared research only.

[3] Based on UK nationalized industries' R&D alone.

INTRODUCTION

DHR's preliminary review of foreign private and, especially, government solar and conservation research, development, and demonstration (RD&D), indicates that significant differences exist between the emphasis of U.S. programs and programs in foreign countries. In general, the U.S. DOE places less relative emphasis than other developed country energy agencies on conservation R&D, short-term commercialization research, information transfer programs, and developing or strenghthening export industries. The first three of these differences will become more dramatically pronounced when the conservation cuts proposed for 1982 take effect. The U.S. solar budget, as a percentage of total energy RD&D, is more comparable with that of other countries, although that too will be one of the smaller percentages when the 1982 budget is passed. The absolute and relative sizes of private conservation and solar spending are more difficult to judge than public investment. What little data is available suggests that the U.S. conservation and solar industries are among the strongest in terms of absolute R&D spending, although when compared to GDP or energy consumption these research budgets are relatively small.

Government RD&D

Of the countries studied, only Japan spent less in 1980 on conservation, as a percentage of its overall energy RD&D budget, than did the U.S. (see table 1).[1] Canada, the Netherlands, and especially Sweden spent considerably more on conservation than the U.S., while West Germany, the United Kingdom, and Australia spent slightly more. If total primary energy consumption is used to weigh the relative size of conservation budgets (to reflect the fact that countries with greater consumption probably have greater conservation potential), the U.S. also spends considerably less than the developed country average. Unless other countries cut back conservation budgets dramatically for 1982, the U.S. will, in the coming year, spend less on conservation RD&D, as a percentage of the energy budget and per unit of primary energy consumption, than any of the other countries studied.

---

[1] Although Japan spent considerably less on conservation than the U.S. in 1980, according to IEA's most recent statistics, these statistics probably do not account for the full impact of the Japanese Energy Conservation Act of 1979 (see note, page J-1).

U.S. solar research spending, relative to the total U.S. energy budget in 1980, was third among the countries examined, falling far behind Sweden and also behind France.[1] U.S. solar research spending is somewhat higher as a fraction of the total energy budget than renewable budgets in Canada, Australia, and the Netherlands, and two or three times higher than budgets in the United Kingdom, West Germany, and Japan. However, if the U.S. solar budget is reduced in 1982 to a third or less of its 1980 level (as is proposed), it will become one of the lowest, as a percentage of total energy spending, in the developed economies.

In addition to budget differences between the U.S. and other western democracies, Japan, and Australia, the U.S. conservation and solar programs differ qualitatively from those of other countries in a variety of important ways:

- the U.S. program focuses much more on medium- and long-term R&D. Foreign governments' primary goals appear to be near-term displacement of oil consumption and an increase in self-sufficiency. As a consequence, their programs' major thrusts are product development, information transfer, and rapid incorporation of energy savings measures or alternative sources of supply into the industrial, building, and transportation sectors;

---

[1] Reports indicate that the French solar R&D budget is expected to increase substantially under Mitterand administration.

- in order to help ensure that industry picks up technologies when government programs stop developing them, a large portion of foreign research ventures are cost-shared. Only a small amount of foreign R&D money is allocated through competitive solicitation;

- a number of other developed economies, especially Sweden, and, to a lesser extent, the U.K., Canada, and Japan, have adopted a variety of performance standards, mandated or provided financial assistance for audits, and similar measures to hasten the introduction of solar and especially conservation measures;

- a greater emphasis is placed in foreign countries on developing technologies specifically for export, and on introducing conservation to cut costs in industries that must compete in the international market. For example, the German and Japanese PV programs, portions of the Canadian solar program, and the Swedish industrial conservation effort are specifically geared either to developing alternative energy export industries, or maintaining a competitive edge in established export markets.

Although the U.S. does have the most extensive R&D program in a variety of solar and some conservation areas (measured in absolute dollar terms), the U.S. could still profit from closer cooperation with foreign governments in a number of areas. In particular, the industrial conservation programs in Sweden, West Germany, the United Kingdom and, to a lesser extent, Japan, support a range of research related to the metallurgical, chemical, and foodstuff industries from which U.S. industry might benefit considerably. These programs are much more closely tied to reducing consumption in critical energy intensive industries than are the analogous U.S. programs.

With regard to other conservation areas, the Swedes and West Germans are supporting extensive district heating programs far more comprehensive than any related U.S. effort. Basic technical inquiries, demonstrations, and studies of how to integrate district heating with solar energy and into u[illegible] energy systems are all being supported.

In the solar area, the Swedish and German wind programs, the German and, to a lesser extent, Japanese photovoltaic programs, the British ocean, and the Japanese geothermal efforts appear to be most worthy of close examination by U.S. program planners. More specific information regarding foreign solar programs and their overlap with U.S. R&D will be included as information is received direct from foreign capitols.

Private RD&D

Private RD&D is far more difficult to assess than government spending. Nonetheless, IEA figures suggest that, at present, the U.S. solar and conservation industries are among the world leaders. Qualitative discussions suggest that the U.S., Japan, and Germany are the leading nations in the photovoltaic, the flat-plate and the concentrating collector markets, while Italy, according to IEA statistics, appears to be the world leader in geothermal technology ($36.7 million private RD&D spent in 1980). Other solar markets (wind, biomass, OTEC) remain too small to suggest confidently that any one country will dominate future world markets.

The U.S. is also among the world leaders in most conservation technologies. Specific conclusions regarding the U.S. position in advanced engine, industrial, building, and other conservation markets, cannot be drawn until additional data has been received.

√2- 3/11 Hr. Corresp.

AD w/attach

Department of Energy
Washington, D.C. 20585

March 15, 1982

Honorable Richard L. Ottinger
Chairman, Subcommittee on Energy
  Conservation and Power
Committee on Energy and Commerce
House of Representatives
Washington, D.C. 20515

Dear Mr. Chairman:

Enclosed are answers to the questions you requested in your March 11, 1982, letter to Mr. Joseph Tribble, Assistant Secretary for Conservation and Renewable Energy, Department of Energy. This information pertains to the March 16, 1982, hearing on the Department's fiscal year 1983 budget request for conservation and renewable energy programs.

If you have any questions, please call Ingrid Nelson or Tom Pretorius of my staff on 252-4277. They will be happy to assist you.

Sincerely,

Thomas H. Pretorius

Robert G. Rabben
Assistant General Counsel
for Legislation

Enclosure

Question 1: Please provide a table indicating the number of FTP employees in each DOE Conservation Office:

Answer:

Conservation and Renewable Energy
Full-time Permanent (FTP) Employees

Office	On Board Feb. 1, 1981	On Board Feb. 1, 1982	Projected 2/ End Strength Sept. 30, 1982
Assistant Secretary	7	8	6
Policy and Management	78	57	11
Power Marketing Coordination	1/	14	9
Conservation	269	154	43
State and Local Program	303	178	62
Hqs	(75)	(56)	(15)
Field	(228)	(122)	(47)
Renewable Energy	177	145	70
Alcohol Fuels	1/	16	0
Total	834	572	201

1/ Power Marketing Coordination and Alcohol Fuels were not part of the Office of Conservation and Renewable Energy in February of 1981.

2/ Per FY 1983 Budget Request. Projected DOE 9/30/82 end strengths are subject to adjustment based on the status of the Federal Energy Reorganization legislation and the FY 1983 Budget.

Questions 2: Please provide any memoranda between the Office of Assistant Secretary Tribble and Conservation Office Program Directors on the issue of the adequacy of staffing and funding levels for 1982 and 1983. This would include any Communication with Deputy Assistant Secretary Maxine Savitz and State and Local Director Mel Chiogioji as well.

Answer: The requested correspondence is attached.

Memo's from Maxine Savitz to Joe Tribble, dated March 4, 1982
February 8, 1982
January 22, 1982

Memo from Mel Chiogioji to Joe Tribble, dated January 19, 1982
Memo from Robert San Martin to Joe Tribble, dated December 1, 1981

(7-79)

U.S. DEPARTMENT OF ENERGY

memorandum

DATE March 4, 1982

REPLY TO ATTN OF Maxine Savitz, DAS/C

SUBJECT DOE Policy Statement on Anticipated Reduction in Force Actions

TO Assistant Secretary
Conservation and Renewable Energy

Over the past several months, I have been asked by the Conservation Program Managers about the status of anticipated reductions in force in FY '82 and FY '83.

I have relayed that a reduction in force to achieve the FY '82 ceiling will likely not be required due to attrition. Of equal, if not greater, concern is an anticipated RIF to accommodate the FY '83 ceiling.

While it is my informed understanding that there will be no RIF to achieve current projected FY '83 targets until the FY '83 budget is enacted, I have not seen any formal statements on this.

Has there been any Departmental policy enunciated on either the FY '82 or FY '83 RIF timing? It would appear to be appropriate to request guidance from MA that we could relay to CE staff on anticipated RIF policy. The key issue would be designation by MA that no RIFs for FY '83 will be conducted until the FY '83 budget is completed. An ancillary issue is whether RIFs would occur under a Continuing Resolution if the full budget were not enacted at the start of FY '83.

It would be of great value to have this determination provided to the staff and would stabilize the programs, as many staff are already leaving in anticipation of a FY '83 RIF occurring in September of this year.

DATE: Feb. 8, 1982

REPLY
ATTN OF: John P. Millhone

SUBJECT: BERD Staff Attrition

TO: Joseph J. Tribble
Maxine Savitz

The attrition of staff from the Office of Building Energy Research and Development is occurring at such a rapid rate it is threatening to cripple our ability to meet our program objectives. This memorandum reviews the situation and makes recommendations.

Current Situation. Since the BERD reorganization was initiated Oct. 1, 1981, there have been 20 staff members who have submitted their resignations, reducing the total office staff from 75 to 55 full-time positions. This is an attrition rate of 27 percent in a little more than four months.

The attrition rate has been higher for BERD than for the rest of CE. The attrition rate for CE was about 8 percent from Oct. 1 to Feb. 1. BAM projected a 20 percent attrition rate for CE in all of FY 1982. Thus far, about half of the staff losses for CE have been experienced by BERD.

BERD has been able to hire back two full time temporary employees, making a current staff of 57, and an effective attrition rate of 24 percent. In addition, BAM is supporting and expediting our efforts to hire three experienced temporary employees for the RCS program. The attrition rate by organization element is shown on the accompanying table.

The BERD management levels are becoming particularly thin. With the exception of John Cable, who will be leaving in March, the division directors are all new on the job. Their experience in their current positions are seven months, four months, and two months.

Of the eight BERD branch chiefs, only one (James Smith) has had this assignment for more than four months.

Some sensitive programs have been particularly hard hit. For example, the branch responsible for the Building Energy Performance Standards has only two professionals, only one of whom has any familiarity with the program.

The RIF preceeding this attrition also has had its impact, probably more through reassignments than separations. Only 20 persons, including secretarial and temporary employees, are in the same positions they held prior to the RIF.

Recommendations. To respond to this rapid turnover and reduction in staff, I believe it is important to take immediate action to fill essential staff positions. I recommend three types of actions in addition to the current effort to hire three temporary employees.

- o Detail of former BERD employees from other parts of CE back to BERD.
- o Hiring of additional full-time temporary employees.
- o Approval of the hiring of consultants.

Staff Details: The detail of persons from other parts of CE back to BERD would mean that other CE offices would have to give up these staff members. I believe this is a reasonable request because of the more rapid attrition of BERD staff and because of the importance of responding adequately to specific statutory responsibilities that are vested in BERD.

The specific staff details requested are:

1. Jacob Kaminsky has shown interest in rejoining the Community Research and Development Branch in the Federal and Community Programs Division. As a result of the RIF, he has been reassigned to the Advanced Energy Systems Branch, Geothermal and Hydropower Division, Office of Renewable Technology. With the resignation of John Rodousakis, BERD has lost the last "technically" qualified person (engineer/scientist) and the last vestige of its "corporate memory" in the community R&D area. The remaining employees are planners or marketing specialists and all are new to the program. Mr. Kaminsky was in the Branch before the RIF, is familiar with the program, and can be of invaluable help in cleaning-up and closing-out the program over the next year. In addition, two Congressionally mandated, FY 1982 Programs, Scranton Mine Water Heat Pumps and Georgetown ICES, require a technical expert to assist in managing the $2.5 million involved. This skill is currently not present in the Branch.

2. Pat Pickering is a former staff member who was reassigned during the RIF to the Office of Renewable Technology, Biomass Energy Conversion Branch as a GS-301/7. Ms. Pickering worked on the RCS staff for about 1 year and ultimately became responsible for the initial review of State plans, and plan amendment proposals. She was also responsible for the development and maintenance of the program's monitoring and technical assistance activities. She had indicated her willingness to return to the RCS program, but her new office is understandably reluctant to agree to a detail without an equivalent replacement and BERD currently has no excess staff to trade. Ms. Pickering's services are urgently needed to carry out the Department's statutory responsibilities under the Residential Conservation Service and related program activities. Her experience and detailed knowledge of the regulatory files of the office, would be very beneficial for completion of current tasks that include the analysis of over 400 public comments on the proposed revision of the RCS regulations.

3. Carol Williams was originally assigned to BSD during the RIF as a secretary, GS-318/7. Ms. Williams was reassigned to the Office of Renewable

Technology in order for a BSD employee, Marilyn Wilbourne, to remain with BSD as secretary to the Division Director. However, Ms. Wilbourne recently resigned and the Division, which was authoried four (4)secretarial positions, now has only 2 secretaries. The return of Ms. Williams is urgently needed due to increasing secretarial support needs generated by proposed revisions in existing rules for RCS and the upcoming development of rules for CACS.

Hiring Additional Full-Time Temporary Employees: The second type of action requested is the hiring of additional full-time temporary employees. These new hires would expire Sept. 30, 1982, so they would provide no financial obligations in FY 1983. Because of the rapid attrition of BERD staff, the office has adequate Program Direction funds to cover the salaries of such FTT employees.

The specific FTT hiring requests are:

1. John D. Rivera, as an Energy Conservation Specialist, GS-13 in the Building Systems Division to serve as program manager for the FY 1982 activities still needed to be completed for BEPS work. Mr. Rivera possesses a unique blend of program management skills with a successful record of accomplishments in dealing with Federal programs relating to the private sector as well as State and Local governments. His experience and familiarity with Federal operations will greatly benefit the Division in the expedient fulfilment of its obligations to develop voluntary guidelines for building energy performance standards. This effort was not proposed for funding in this FY. When it later received funding the staff was not available to perform the needed function of program mangement for the tasks associated with this activity. Since this activity will run only through FY 1982 hiring a permanent employee would not be appropriate. Therefore, we are proposing that the authority to hire Mr. Rivera on a full-time temporary appointment NTE 9-30-82 be approved as soon as possible. It is important to realize that time is of the essence in bringing a person up to speed quickly for this project. Mr. Rivera has the background for both program management and Federal operations. In addition, Mr. Rivera brings with him experience in dealing with building codes and standards with both State and Local governments and the private sector. Therefore, he could immediately begin to perform the needed functions without the need for long time consuming training sessions. Additionally, Mr. Rivera is available to begin work immediately and is looking for this type of temporary employment for the next year or so, factors which works out to our benefit.

2. Beverly J. France, as an Energy Conservation Specialist, GS-7, in the Building Systems Division. The purpose of this position is to perform a variety of assignments related to the technical information inquiries received in response to the R&D activities of the Division. Because of the uniqueness of the R&D activities being performed the current technical staff is overwhelmed by the number of requests flowing into the Division. In an attempt to relieve the staff of the burden of responding to non-technical requests we are developing an information system of response through the National Laboratory System. Because of the time involved in working with the Laboratories in establishing such a system and the limited staff available to work with the Laboratories in responding to Division requests, it is necessary to have a full-time employee available to assist in successfully completing this effort. The Laboratories will then assume the responibilities associated with operating the

system. Ms. France has the necessary background to perform this function and we already have a slot and position approved for this activity. Ms. France has knowledge of the Federal and Laboratory interface and of the activities needed to have a smooth relationship between them develop and expand to accomplish the Division's goals. She has developed this knowledge through past work experience and is anxious to continue this work in this capacity as a temporay employee. Her availability is immediate and references indicate that she would be a valuable asset to the Division.

3. Clerk-Typist, GS-322-4/5, for the Building Systems Division. This position was approved in the reorganization and subsequent RIF action last Fall but was not filled at that time. Due to an increasing workload and the short timeframes often associated with the Division's work, heavy secretarial demands are placed on the current staff. The Division is seeking to relieve this burden by hiring a full-time temporary clerk-typist. With the summer vacation months ahead and the continued heavy workload expected over the coming months it becomes a vital concern of the Division that their work not be delayed by lack of the necessary secretarial support. The Division does not have a specific candidate in mind at this time but feels that the need for this position is critical to effective operations and achieving the Division's goals.

4. Karen Vavrick, Energy Conservation Specialist, GS-301-5/7, for the Building Systems Division to assist in reorganizing the technical and administrative records to reflect the current organizational and programmatic requirements of the Division, systematically storing technical documents in preparation for the drastic curtailment of the program as well as for their easy retrieval for response to routine requests for documentation and preparation of the actual response to these requests. Additional duties would involve miscellaneous office tasks included in the daily operations of the office. Ms. Vavrick has previously worked for the BERD Office and is familiar with the Office routine and requirements and would prove to be of valuable assistance to the staff in handling some of the routine workload of the daily activities thus freeing up the staff to direct their attention toward program management.

5. Clerk-Typist, GS-322-5, for the Federal and Community Programs Division. The need for additional clerical positions that is evident throughout CE is particularly severe in the Federal and Community Programs Division. Four clerical positions have been authorized for this Division. However, at the present time, we have two secretaries servicing one Division Director's office and two branches. The workload in this Division is extremely heavy due to ongoing, Congressionally mandated activities and due to the fact that the FY 1983 budget for this Division carries with it specific legislative requirements. We feel that these requirements cannot be accomplished in an efficient and effective manner without additional secretarial/clerical staff. Although this is not a name request, the current position is at the GS-5 level. The job requires an experienced person who already has a working knowledge of government office procedures.

6. Quonnie Laughlin, GS-345-13, Program Analyst for the Building Services Division. Ms. Laughlin is a former BERD employee whose work involved substantial interaction with the public and private sector, particularly State and local officials. She is adept at preparing analyses and written responses. At one time she was an assistant to Maxine Savitz and had responsibility for the RCS program. She was also previously employed by the National Governor's Association where her assignments included providing NGA input used in the development of the RCS program. Her experience with the public and private sectors, extensive familiarity with the RCS program, and analytical ability make her highly suitable for working with the RCS program and related regulatory matters, particularly the RCS program evaluation scheduled for this year.

7. Leonard Crumb, Energy Conservation Specialist, GS-301-5/7 for the Building Equipment Division. This employee is needed to support the Test and Evaluation Branch (TEB) which has lost three professionals, 40% of its staff, since October 1. He would assist TEB staff in collecting and organizing information to support preparation of *Federal Register* Notices, to support analysis of comments, and arrangements for public hearings relating to proposed and final rule makings for standards. He would also support the more experienced professional staff by performing time consuming but routine tasks, in responding to administrative information needs; thus making Division responses more timely and complete.

Hiring of Consultants: The third type of action requested is approval of the hiring of consultants to fill specific staff weaknesses that can't be filled any other way. This is particularly important in some of the highly technical areas, such as architectural and engineering systems. The loss of key staff has been particularly severe in the engineering and architectural areas. I don't yet have specific hiring recommendations, but am starting to contact some persons who I believe could provide the support needed in these areas.

cc: R. Henrich

STAFFING LEVELS

OFFICE OF BUILDING ENERGY RESEARCH AND DEVELOPMENT

	Oct. 1 1981	Feb. 2 1982
BERD Office	6	5 (1)
Building Systems Division Office	3	2
Building Energy Sciences Branch	8	5
Architectural and Engineering Systems Branch	7	3
BSysD Subtotal	18	10
Building Equipment Division Office	4	4
Energy Conversion Equipment Branch	7	5
Test and Evaluation Branch	7	5
BED Subtotal	18	14
Building Conservation Services Division Office	4	3
Applicantions Research and Development Branch	6	4
Technical Services and Programs Branch	6	4 (1)
BCSD Subtotal	16	11
Federal and Community Programs Division Office	4	4
Federal Energy Management Program Branch	8	7
Community Research and Development Branch	5	3
FCPD Subtotal	17	14
BERD Total	75	54 (2)

Temporary employes are not included in the Feb. 2, 1982, totals and are indicated by parentheses.

U.S. DEPARTMENT OF ENERGY

memorandum

DATE: January 22, 1982

REPLY TO ATTN OF: John J. Brogan, Director, CE-14

SUBJECT: Request to fill vacant position in Office of Energy Systems Research

TO: Joseph Tribble, CE-1

THRU: Maxine Savitz, DAS/C 1/20/82

Background: As a result of the September 25, 1981, reduction in force (RIF), the Office of Energy Systems Research (ESR) has sustained its share of losses of key personnel. One person in particular had occupied a position that is crucial to the effective management of ESR.

Mary Honablew, a GS-12 program analyst before the RIF, had been responsible for analyzing, tracking, and handling financial matters: each budget iteration, all travel funds and reports, and procurement activities. Her recent performance appraisal was Highly Successful.

Donald Elmer became her replacement due to the RIF, and Ms. Honablew was downgraded to a GS-7 and eventually assigned to Biomass Energy Technology Division in Renewable Technology. Mr. Elmer, meanwhile, has been on an Intergovernmental Personnel Act (IPA) assignment to Lawrence Berkeley Laboratory. At the request of Dr. Frederick Morse in Solar Heat Technology (the losing organization), we allowed Mr. Elmer to complete his IPA assignment and remain in California. During his absence, Ms. Honablew's new supervisor in Biomass accepted our proposal of three 30-day details to enable her to carry out Mr. Elmer's duties and to train him as her replacement upon his return. The second detail has now ended, and her new supervisor will not extend it. Mr. Elmer recently indicated that he will not return to DOE Headquarters; his employment will now be terminated. As a result, ESR will have a new vacancy that had not been expected, and there will be no person to fill it.

It is important to be aware that ESR has the largest FY 1982 budget (up to $75 million) in Conservation. We have a small staff to administer it (ESR has the highest per capita budget in Conservation). The ESR ceiling is 35. We have a total of 9 vacancies: 8 professional and 1 secretarial. The secretary (Frances Rhoades) is on detail to BAM/Executive Secretariat.

Problem: Ms. Honablew's departure will cause a gap in efficient processing of budget, procurement, and travel paperwork. We anticipate that her absence will adversely affect the ESR response time to financial fire drills. Staff in ESR is already spread so thinly that assigning Ms. Honablew's duties to others would be considerably less efficient than retaining her--a fully experienced person who knows the ESR program--to the job.

The need for a program analyst experienced in financial matters is crucial to ESR management. Electric Energy Systems is closing down this fiscal year, Energy Storage will close out almost everything next fiscal year, and the

Energy Conversion and Utilization Technologies (ECUT) function is changing significantly. Budget analyses must be carried out; estimates and monitoring of budget obligations must be performed. I feel very strongly that a person already knowledgeable in ESR programs, especially ECUT, will be best suited to survive any reorganization to assume a fiscal 1983 personnel ceiling. Ms. Honablew, to my mind, meets these criteria.

Additional Information: As a result of the RIF, Frances Rhoades has been assigned to a secretarial position in my Electric Energy Systems Division. While we understand that Ms. Rhoades' detail to BAM/Executive Secretariat allows her skills to be better used than in ESR, we would definitely prefer that she report to ESR if no acceptable solution to Ms. Honablew's situation is offered. We feel that we have bent over backwards to help other offices when they have had the same problems.

Solution: I propose that we be allowed to permanently transfer Mary Honablew from a GS-7 position in Biomass to a GS-11 in ESR. The loss sustained in Biomass would surely be considerably less than ESR's loss of an experienced person in a critical position. In addition, if allowed to have Ms. Honablew permanently, we would accept the permanent loss to ESR of Ms. Rhoades. I feel these actions would be the fairest solution to the problem.

A less desirable alternative would be a 6-month detail to ESR for Ms. Honablew. In exchange, we could be persuaded to allow a 6-month detail for Ms. Rhoades to remain in BAM. Performance appraisals could then be written for each person by the gaining organization.

We would appreciate your expeditious handling of this request to fill the critical vacancy in ESR.

Approve	Disapprove	
________	________	Fill ESR vacancy permanently with Mary Honablew
________	________	Detail Mary Honablew for 6 months to ESR

DOE F 1325.8
(7-79)

U.S. DEPARTMENT OF ENERGY
memorandum

DATE JAN 19 1982

REPLY TO ATTN OF CE-20

SUBJECT FY 1983 Congressional Budget, State and Local Assistance Programs (SLAP) Staffing Levels

TO Joseph J. Tribble, CE-1

This will respond to your memorandum dated Tuesday, January 12, 1982, which conveys to the Controller the results of your decision to revise downward the requested minimum staffing levels of 160 FTE in FY 1982 and 125 FTE in FY 1983 for SLAP. While we will abide by your decision, I feel it is necessary to convey to you my strong concern over the program impacts of this decision and our ability to effectively process and monitor SLAP grants for FY 1982 and 1983.

Our previous staffing recommendations for SLAP were based on FY 1982 and 1983 closeout of these programs. As you know the FY 1982 appropriation has now provided funding in the amount of $243.9 million to operate and fund all six categorical grant programs as opposed to the original budget request of $87 million for Schools and Hospitals and closeout of the balance of SLAP. These six programs, Schools and Hospitals, Weatherization Assistance, State Energy Conservation, Appropriate Technology, Energy Extension Service and Energy Related Inventions affect 50 States and 7 Territories. As a result of the Congressional action we revised our staffing request for FY 1982 and 1983 to reflect the fact that the programs were fully funded in FY 1982. We did an analysis of our staffing needs and estimated that to operate the program at maximum efficiency we would need an FTE strength of 244. However, our minimum staffing estimate to adequately operate the program in FY 1982 was 160 FTE and in FY 1983 was 125 FTE to closeout the existing and new grants which will be issued in FY 1982. Even under the previously funded closeout budget the minimum staffing level was 130 FTE in FY 1982. This was subsequently reduced by 32 FTE as a result of your decision to reallocate CE resources and take all of the 6 percent reduction from SLAP because of the proposed phaseout of the Schools and Hospitals Program in FY 1982. As a result our revised FTE figure was 98.

With the revised budget action by the Congress we requested that the 32 FTE be immediately restored to the field offices so that we could expeditiously process the grants, particularly in the Weatherization Assistance Program and provide adequate monitoring of existing and new grants. In addition, we requested 30 FTE to operate the funded SLAP for FY 1982. This brought us to a minimum request of 160 FTE in FY 1982 and 125 FTE in FY 1983. ~~Your decision to deny the staffing request will have a definite impact on our ability to expeditiously process the FY 1982 grants and will certainly impact our ability to monitor and closeout new and existing grants in FY 1983.~~ This is due to the fact that the conservation grant programs can not be directly correlated on a one to one basis for funding with staffing levels since the complexity of managing the grants in the 50 States and 7 Territories requires basically the same level of effort regardless of the level of grant funding. I am concerned that we will be unable to meet the congressional intent to operate fully funded grant programs since there are insufficient resources allocated to do the job, particularly in the field offices. Your decision on our staffing request will definitely impact our ability to expeditiously process FY 1982 grants, particularly weatherization, and will impact our ability to monitor and closeout new and existing grants in FY 1983 since our revised staffing ceilings for FY 1982 is now 98 FTE and in FY 1983 it is 62 FTE. This will require a program Reduction-In-Force(RIF) staff announcement in June to meet the FY 1982 year end ceiling goals with adequate employee notice.

I urge you to reconsider this decision so that we might effectively closeout the program in a professional manner. I am available to meet with you and discuss any guidance you may have on this matter.

Attachment

Melvin H. Chiogioji, Director
State and Local Assistance Programs
Conservation and Renewable Energy

[illegible]

U.S. DEPARTMENT OF ENERGY

memorandum

DATE December 1, 1981

REPLY TO ATTN OF

SUBJECT Post - RIF Staffing Status

TO Joseph J. Tribble
Assistant Secretary
Conservation & Renewable Energy

The attached table provides a breakdown of the post-RIF staffing status for the Office of Renewable Energy. At the beginning of FY 1981 Renewable Energy had an authorized manpower level of 247 and an on-board strength as of July 1981 of 223. As a result of reorganization and the RIF, the Renewable Energy manpower level was reduced to 194. On-board strength as of November 1981 is 151.

Excluding the SES, 77% of the Renewable Energy post-RIF positions are either vacant (24%) or filled with personnel new to the job (53%). This ranges from 69% for Solar Electric to 100% for the RTI staff. In view of the magnitude of staff moves, my management team has made the necessary adjustment to ensure that major program activities are continued while the new staff acquires a full capability in their new assignments.

Robert L. San Martin
Deputy Asistant Secretary
for Renewable Energy
Conservation and Renewable Energy

Attachment

November 30, 1981

DAS/RENEWABLE

Staffing Status After Implementation of the RIF

Office	1981 Positions On-Board Before RIF	1981 Positions Authorized After RIF	SES	Results of the 1981 RIF: In Same Position	Results of the 1981 RIF: Same Office, New Position	Results of the 1981 RIF: New Office and Position	Total On-Board	Current Vacancies
DAS/R	7	5	2	1	0	1	4	1
Research & Technology Integration Staff	19	8	2	0	1	6	9	0
Solar Heat Technologies	59	55	4	10	10	16	40	15
Solar Electric Technologies	64	60	4	17	3	23	47	13
Renewable Technology	74	66	5	13	5	28	51	15
TOTALS	223	194	17	41	19	74	151	43
Percentages of 1981 Authorized Positions		100%	9%	21%	10%	38%	78%	22%

Senator WEICKER. Thank you all very much, and your statements and your supporting documents will be included in the record in their entirety, and the committee will stand in recess.

[Whereupon, at 10:32 a.m., the hearing was adjourned.]

APPENDIX

ADDITIONAL STATEMENTS AND COMMUNICATIONS SUBMITTED FOR THE RECORD

WILLIAM A. O'NEILL
GOVERNOR

ANN L. SULLIVAN, DIRECTOR
WASHINGTON OFFICE
STATE OF CONNECTICUT
444 NORTH CAPITOL STREET, SUITE 317
WASHINGTON, D.C. 20001
TELEPHONE: 202-347-4535

April 5, 1982

Mr. Gary Barbour
Senate Energy and Natural Resources
Subcommittee on Energy Conservation and Supply
3204 Dirksen Office Building
Washington, D.C. 20510

Dear Mr. Barbour:

Enclosed please find a copy of the Office of Policy and Management-Energy Division testimony which is submitted for inclusion in the record for the hearing held by the Energy Conservation and Supply Subcommittee on March 30, regarding the Administration's proposed FY'83 energy conservation budget. I apologize for the condition of this telecopied draft but thought the matter important enough to supply you with the testimony in time for the record deadline. A clean copy of the testimony is being mailed directly to you by the OPM-Energy Division today.

Please feel free to contact me directly with any questions you may have concerning this statement. We appreciate the opportunity to comment on this matter.

Sincerely,

Cynthia A. Ittleman

Cynthia A. Ittleman
Legislative Assistant

Enclosure

WRITTEN COMMENTS SUBMITTED TO THE
U.S. SENATE
ENERGY AND NATURAL RESOURCES COMMITTEE
SUB-COMMITTEE ON CONSERVATION AND SUPPLY

IN REGARDS TO THE MARCH 30, 1982 HEARING
ON THE FISCAL YEAR 1983 ENERGY CONSERVATION BUDGET

COMMENTS SUBMITTED BY:

Mr. Bradford S. Chase
Acting Under Secretary
State of Connecticut
Office of Policy and Management
Energy Division

April 5, 1982

WRITTEN COMMENTS SUBMITTED TO THE U.S. SENATE SUBCOMMITTEE ON CONSERVATION AND SUPPLY OF THE ENERGY AND NATURAL RESOURCES COMMITTEE

Submitted by: Bradford S. Chase, Acting Under Secretary for Energy,
State of Connecticut, Office of Policy and Management,
Energy Division

Submitted: April 5, 1982

IMPACTS OF PROPOSED FY '83 BUDGET CUTS

In the past two years, there has been a dramatic shift in energy policy from what it was in the latter half of the 1970's decade. From 1976 through 1980, federal policy established a significant federal and state presence aimed at reducing oil dependence, and intensifying conservation efforts. Since that time, federal policy has been directed at dismantling this federal and state capability, and relying instead on energy exploration and increased production, and allowing the marketplace to allocate energy resources and determine prices.

This change in federal policy is of grave concern in Connecticut because of what it signifies in terms of the federal/state partnership for dealing with our energy problems, and in terms of its impact on the state initiatives. To understand these issues, a brief overview of the Connecticut energy situation is presented. This is followed by an outline of the impacts of this reduction on the economy and citizens, and a description of impacts on state government capacity and activity.

CONNECTICUT ENERGY SITUATION

Each year in Connecticut, the equivalent of 126 million barrels of oil is consumed for all energy requirements. Petroleum products actually constitute 71% of that total, followed by nuclear fuel at 19%, and natural gas at 9%. All other fuels combined make a very small contribution to our fuel mix. This contrasts sharply with the national pattern when oil constitutes only 47% of the mix, natural gas 26%, and coal 19%. Hydropower, followed closely by nuclear, together represent most of the remaining energy sources.

None of the major fuels used in Connecticut are produced in the state. In 1980, the total annual energy cost reached $4.4 billion, with $2.9 billion of that money being exported to other states and countries. These billions of dollars could otherwise have been invested in Connecticut's economy. Production, distribution, marketing, and pricing decisions for oil, natural gas, coal and nuclear fuel occur for the most part outside Connecticut's borders.

The current energy supply environment is much more optimistic than a few years ago. U.S. energy demand has declined 5% in the last two years. 1981 oil imports were down 13% from 1980 levels. But our fundamental problems of imported oil dependence and vulnerability of each of that supply persist. Connecticut's larger petroleum dependence implies greater vulnerability than for the nation as a whole.

One of the most serious dangers we face is to let complacency cause us to lessen our commitment to reducing energy consumption. We should continue to use energy efficiently and to replace oil with alternative sources. That commitment remains the cornerstone of Connecticut's energy policy, but a strong consistent policy and financial support are essential to sustaining state and local efforts.

ECONOMIC AND SOCIAL IMPACTS

Current federal energy policy relies on the marketplace to obtain the most efficient combination of energy production and consumption. This policy fails to recognize that significant segments of the economy are unlikely to implement conservation or renewable resource measures under the impetus of market forces alone. Rental units constitute 30% of the state's housing stock and are often older, less insulated structures. The bulk of fuel assistance recipients live in this older housing stock. Conservation improvements in this area will require incentives beyond market forces.

If oil prices continue to decline in the short run, market forces may act to reverse construction habits and discourage investment in construction, new technology and oil alternatives. This may be contrary to long-term security and market stability.

State-sponsored conservation programs target these situations and attempt to reduce petroleum vulnerability and promote a more diverse fuel mix. This contributes directly to national security, but receives no allocation within the proposed federal budget. Contrast this to the expanded fiscal resource commitment to defense which will do little to enhance national security in the energy area.

The elimination of federally-supported conservation programs will make it more difficult to reduce the energy needs of low-income families. The Public Information program, through its one-on-one approach, has been successful in promoting conservation among low-income households. The weatherization program for low-income households is also slated for reduction or elimination. The argument for this change is that the funding for a DOE-type weatherization program is available through the energy assistance block grant. This argument is fallacious from two perspectives. First, the block grant program disallows any conservation measure that goes beyond the low cost/no cost definition. Second, the block grant is proposed to be cut by more than 25%, virtually eliminating the opportunity to pay for weatherization activities.

Given a 25% cut in the energy assistance block grant program in FY '83, Connecticut will have to either reduce its benefit levels, or reduce the number of households it can serve. This situation is made worse by the thrust of other federal initiatives and resultant cuts in other social service programs, which leads to great need and participation in the energy assistance program.

CONNECTICUT ENERGY DIVISION IMPACTS FROM FEDERAL BUDGET CUTS

The FY '82 federal budget, and proposed FY '83 federal budget represent a collapse of support for the state-level efforts and capabilities developed carefully since the 1973 oil embargo.

During FY '82, the loss of half of our federal funding, over $1 million, resulted in a one-third reduction in Energy Division operations. Programs aimed at reducing transportation sector use of fuel were eliminated, as were programs for fuel oil dealer training, technical services for citizens, and oil recycling. The petroleum allocations and set-aside programs ceased. At the same time, renewable resources programs, energy information and outreach services, and commercial/industrial conservation programs were curtailed.

The proposed FY '83 federal budget will cut out the remaining $1 million in federal funds. The remaining, renewables, education, outreach and conservation programs will be eliminated. While the state has made a large commitment to supporting energy activities, $1.2 million in FY '83 for the Energy Division, the state will not be able to make up for the federal $2 million lost in two years. This dismantling of staff has impact well beyond the programs immediately affected, to the full range of policy and emergency preparedness responsibilities of the Energy Division by eliminating expertise and experience in specialized areas.

At issue is state level capacity in the whole energy area. At stake is all the states' abilities to exercise leadership roles in dealing with energy problems and developing a more secure energy future.

National Governors' Association

Richard A. Snelling
Governor of Vermont
Chairman

Stephen B. Farber
Executive Director

April 1, 1982

Mr. Frank Cushing
Subcommittee on Interior and
Related Appropriations
Committee on Appropriations
1208 Dirksen Senate Office Building
Washington, D. C. 20510

Dear Frank:

I am writing to you on behalf of the National Governors' Association to request that the enclosed testimony supporting continued funding for state energy conservation grant programs be included in the hearing record for March 3.

The Governors strongly believe that the total federal funding for the state energy conservation programs (EPCA and ECPA), energy extension service (EES), schools and hospitals program, and the low income weatherization program must not fall below the $225.6 million provided in the FY 1982 appropriations. We are concerned, however, that the $24.0 million provided for SECP and the $9.6 million provided for EES in FY 1982 are somewhat below the "bare bones" level needed to support the core staff and resources of the state energy offices in a time of increasing state responsibilities and reduced federal involvement, and we would specifically urge the Committee to consider reallocating monies from other conservation programs to increase funding for EPCA/ECPA to $35 million and EES to $15 million in FY 1983.

Sincerely,

Yolanda Heuser

Yolanda Heuser
Staff Associate for Energy Liaison
Committee on Energy and Environment

cc: Charles Estes

✓bcc: Gary Barbour

Testimony of

Margaret Garland
Director, Vermont Energy Office

on behalf of

The National Governors' Association

Before the

Subcommittee on Interior and Related Appropriations
Committee on Appropriations
U. S. Senate

March 3, 1982

Statement of the National Governors' Association (NGA)

The Governors strongly support continuation of the existing state energy conservation grant programs, including the State Energy Conservation programs (SECP), the Energy Extension Service (EES), Schools and Hospitals, and Low-Income Weatherization. At the winter meeting of the Governors in February 1981, the Governors identified funding for these programs as the principal priority among all of the Administration's proposed cuts in energy and environment programs. At the NGA's midwinter meeting in February of this year, the Governors reiterated their support for continued federal involvement in conservation, and adopted policy opposing cuts in funding for any state grant programs below the FY 1982 levels pending some agreement between the Governors, the Administration, and the Congress on a specific plan for the "new federalism".

The state conservation grant programs, which maintain essential energy conservation and emergency preparedness activities in many states, already sustained significant cuts in FY 1982 and are currently somewhat below a "bare bones" level. These budget cuts are forcing many State Energy Offices to sharply curtail their activities and to let experienced personnel go. Although the states would like to offset the loss of federal funds with state monies, many are facing severe budget constraints and are unable to do so.

We agree with the Administration that the price is frequently the strongest incentive for conservation. However, we believe that, in order for the market to work properly, accurate and unbiased information must be made available to those individuals and businesses who wish to undertake energy saving measures. After paying all of their other bills, most people have only a small amount of money left over to invest in energy conservation. State Energy Offices, primarily through the SECP and EES programs, are able to provide these citizens with information and assistance in determining how to maximize their investments in conservation. There is really nowhere else that the average citizen can go to get this type of assistance -- he certainly will not get it from the storm window manufacturer or the home insulation salesman.

Similarly, many individuals are in the unfortunate position of being unable to even respond to market incentives. We are referring, of course, to those individuals on fixed and low incomes for whom the decision is a more basic one of "heat or eat". Both the low income fuel assistance program and the weatherization program effectively respond to the needs of this group and must be continued. We strongly support the action taken last year to allow states to use up to fifteen percent of their LIEP funds for weatherization. Although demand for fuel assistance monies was particularly high these past few months because of the unusually cold winter experienced throughout most of the country, the states have long supported increasing funding for weatherization, since a one-time investment in the program can substantially reduce continued dependence on fuel assistance payments. We were encouraged by the depth of support for these programs which was demonstrated earlier this session when both Houses of Congress voted to provide $123 million in supplemental appropriations to bring FY 82 funding for the low income fuel assistance program up to the FY 1981 level.

Additional testimony for the record is attached which discusses each of the state conservation grant programs in more detail, provides estimates of the cost-savings which can be attributed to each program, and describes some "real world" examples of specific activities which have been undertaken by several of the states.

We would like to emphasize why we believe that it is so important to continue federal funding for these programs.

Congress has already demonstrated strong support for the low income weatherization program, so we will not dwell on it except to urge you to remember that a dollar spent once to weatherize a home is much more cost-effective than the dollar spent over and over again to pay for the fuel which heats the "energy sieves" in which many of our fixed and low income citizens live; and we believe that any increase in funding above the $150 million provided for this program in FY 1982 will be money well spent.

The states are concerned, however, that the importance of the SECP and EES programs is not fully understood. These programs, which are commonly referred to as the "core" programs, are just that. They provide the basic or "core" support for State Energy Offices in many states, and fund a broad range of activities, including informational and technical assistance programs and emergency preparedness. We fear that since these programs provide basic support for day-to-day operations and personnel, any loss in funding for SECP and EES would also severely jeopardize the schools and hospitals and weatherization programs in many states.

We feel that the $24 million provided for SECP and the $9.6 million appropriated for EES in FY 1982 are somewhat below the "bare bones" level needed to support the core staff and resources of the state energy offices in a time of increasing state responsibilities and reduced federal involvement, and we would specifically urge the Committee to consider reallocating monies from other conservation programs to increase funding for EPCA/ECPA to $35 million and EES to $15 million in FY 1983. We recognize that monies are even tighter this year than last year and that the nation is facing a budget deficit which seems to increase every time we turn around. However, we believe that at a time when the federal government is phasing itself out of energy, it is more important than ever to provide funding to permit the fifty states who still believe that energy conservation and emergency preparedness are important to continue these activities at the state level.

Finally, we note that the Administration has proposed to rescind the $5.7 million remaining from the $7 million originally provided to the states for gas rationing pre-implementation planning in FY 81 and then returned to DOE. Since these funds would otherwise have been spent by the states for activities under SECP in FY 1981, we would urge that, instead of rescinding the money, Congress provide it to the states for emergency planning. We urge your support for continued funding for these most important State Energy Conservation programs.

We also strongly support continued funding for the "Schools and Hospitals" program. The high level of participation in this program clearly demonstrates how effective it has been in encouraging institutions to undertake energy conserving actions.

Testimony of

Margaret Garland
Director, Vermont Energy Office

on behalf of

The National Governors' Association

Before the

Subcommittee on Interior and Related Appropriations
Committee on Appropriations
U. S. Senate

March 3, 1982

The Governors support continued federal funding for the State Energy Conservation programs for the following reasons:

- First, it is in the national interest that we continue to promote conservation as a way to help restrain inflation generated by rising fuel costs resulting from oil decontrol and proposed natural gas decontrol. Estimates of the effects of energy prices on inflation in individual states are as high as 5 percentage points. The costs of the core state energy conservation grant programs (SECP and EES), the Weatherization Program, and "Schools and Hospitals" programs together represent less than 1/100 percent of the total federal budget, causing little if any, inflationary effect, while the programs themselves have an inflation restraining effect.
- Secondly, although rising energy prices have increasingly motiviated companies and individuals to seek energy conserving methods, many consumers do not have either the front-end funds or accurate information in order to actually undertake energy saving actions. In a world of rapidly rising energy prices, states and local governments have served as the primary delivery mechanism for information and technical assistance necessary to consumers in taking these energy saving actions.
- Third, low-income individuals will feel the burden of rapidly rising energy costs more intensely. Low-income people now spend an average of 30 to 40 percent of their income on direct energy costs, while the middle income spend approximately five percent. Conservation is the most effective method of relieving this burden. The state conservation programs target assistance to these low-income groups. States are moving to couple home energy audits under the Residential Conservation Service program with the delivery of low-income weatherization.

- Fourth, it is crucial to the health and safety of the people of this nation that the ability at the state level to deal with major oil supply disruptions be developed and maintained. The federal government is currently unprepared to cope with a major oil supply disruption. The state set-aside program has been discontinued with the elimination of the allocation and price control system.

  States have worked hard to put into place a strong energy emergency response program. Yet, last year, the $10 million appropriated for state grants under the Energy Emergency Conservation Program (EECA) in FY 1981 was rescinded. Because of these and other cuts in the state conservation grant programs, the states are being forced to lay off personnel who are familiar with the supply/demand patterns in the state and the distribution system and who can, if the need arises, act in an expeditious manner. These cuts are occurring at precisely the same time that state responsibility for emergency preparedness is dramatically increasing. With the expiration of the EPAA on September 30, 1981, and a threatened Presidential veto of the Standby Petroleum Allocation legislation (S. 1503), states' emergency planning is increasingly important.

  Without the states as a first line of defense in a national crisis, we will be no better prepared as a nation than we were in the embargo of 1973 -- only the next time, the shortage is likely to be far more severe.

In the remainder of my testimony, I will briefly describe to you the core state conservation grant programs and provide specific examples of state measures undertaken by the states under the federal grant programs.

The Core State Conservation Grant Programs

The State Energy Conservation Program (SECP) (established by the Energy Policy and Conservation Act of 1975 (EPCA) and the Energy Conservation and Petroleum Act of 1976) and the Energy Extension Service (EES) have been viewed by states as the core energy grant programs. Together, SECP and EES have established the states as the basic delivery system for a national energy conservation program and have provided the basic seed money and stimulus for the development of state energy policy and programs. Over time, these programs have been drawn upon to provide support for new federal initiatives such as the Residential Conservation Service Program and the Energy Emergency Conservation Program.

The states can promote increased efficiency through their authority in such areas as building codes, utility regulation, taxes and bond programs, transportation decisions, and through direct technical assistance programs to the commercial, industrial, institutional, and residential consumer as well as local government.

A conservation analysis of four major SECP program measures demonstrated a very attractive cost-benefit ratio of 1 to 5 in 1979. For every federal dollar spent, the equivalent of $5.40 worth of energy was saved. The study attempted to include only those savings which could be directly attributed to SECP, controlling for the effects of price increases by comparison group surveys conducted by the state energy offices, or "attribution" factors available in other studies.

According to another DOE study, EES clients in the ten pilot states saved the equivalent of 6,400 barrels of oil per day beyond what would have been saved without the program. The cost of achieving these additional energy savings averaged $8.50 per barrel of oil equivalent. Compared to the cost of buying a barrel of imported oil ($30 - $35), the EES is clearly cost-effective. For 1980, it was estimated that 6.9 million barrels of oil equivalent was saved beyond what would have been saved without the program.

Examples of State Measures

Examples of effective state conservation measures are numerous. I will describe to you a sampling of measures to illustrate the nature of the programs states have undertaken.

o Boiler Efficiency Improvement Seminars

Boiler efficiency improvement seminars are popular and quite widespread among the states.

The dollar savings associated with this single SECP-supported program in a single state were greater than the entire cost of the national SECP and EES programs combined.

Let me describe the New York program in greater detail.

For the purpose of providing practical information on measuring and improving the efficiency of boilers to operators of large heating systems, the New York State Energy Office conducted a series of 19 two-day seminars in 11 different cities since July 1979. These seminars trained approximately 1,100 boiler operators in New York State from schools, colleges, hospitals, industries, businesses and office buildings.

Program evaluation efforts indicate that the seminars have resulted in annual savings of 115 million equivalent gallons of oil valued at about $95 million at current prices. The combined national cost of the SECP and EES programs in 1980 was only $72.8 million.

Specifically, as a result of the seminars:

- the average annual saving per facility where efficiency improvements were achieved as a result of the seminars is about 185,000 equivalent gallons of oil valued at $150,000.
- eighty-three percent of the facilities represented at the seminars increased the efficiency of their boilers by an average of 3.4 percentage points.
- sixty-five percent adopted at least one energy savings measure as a result of the seminars and forty-seven percent adopted from one to four conservation measures.

o Statewide Energy Conservation Standards

As of January 1, 1981, 47 states had adopted voluntary or mandatory energy codes for new buildings.*

In Oregon, for example, every new commercial and residential building is required to meet statewide energy conservation standards. A recent study estimated that Oregon's 1974 residential code (which has since been substantially upgraded) reduced space heating energy use in homes heated by natural gas by 40 percent compared with homes built before the code took effect.

New commercial and institutional buildings constructed in Oregon are not permitted to exceed maximum lighting power standards, and Oregon has a voluntary lighting power standard for existing buildings. With federal funds,workshops have been conducted for architects and engineers to assist them in complying with the lighting standards and the structural code conservation standards. Federal funds are also enabling the Oregon State Homebuilders to conduct training sessions on energy-efficient construction techniques that comply with and often exceed code requirements.

Oregon law requires new multiple-unit residences to have separate electric metering for each unit, a requirement that a 1975 Federal Energy Administration study estimated could result in per unit electricity savings of about 35 percent. In addition, natural gas furnaces, water heaters, clothes dryers, ranges, and pool heaters sold in Oregon are required to have intermittent ignition devices to eliminate pilot light waste.

---

* 1980 Federal and State Actions in Energy Codes, Standards, Legislation, and Regulations. National Conference of States on Building Codes and Standards Inc. January, 1981.

o Industrial and Commercial Audits, Seminars, and Workshops

Another popular measure in the commercial and industrial sector is energy audit programs. On-site audits, seminars, and workshops for Illinois industrial and commercial community showed energy savings of 13 trillion BTUs in 1980. This amounts to between $9 - $36,000 in annual savings per facility audited. Savings figures were based on follow-up surveys and show savings directly attributable to the audit.

Examples of audits which have been undertaken include:

1. United Airlines Ground Operations facility at O'Hare revealed $113,990 annual energy savings opportunities.
2. Chicago White Metal Castings, a producer of aluminum magnesium and zinc castings, could save 15% of their energy consumption.
3. Mother McGee's restaurant in Kankokee was shown areas where they could save up to 19% of the restaurant's current energy use.

o Energy Efficiency Procurement Practices

All states have begun energy efficiency procurement practices under the SECP. It is estimated that efficient procurement practices in Washington State saved 90.49 x 10^9 BTUs in 1980. These savings were achieved through the use of gasohol in state vehicles; the recycling of waste drain oil; the recycling of scraps from the state printer into scratch pads; the use of econ-o-watt lighting; the purchase of more energy efficient automobiles and trucks; and the use of pellitized wood waste fuel in Western State Hospital and the Solider's Home at Orting. The total dollar savings of these measures were estimated to be $9,265,800 with a cost of only $194,955 through 1980, resulting in benefit/cost ratio of 47.53 to 1.*

---

* Energy savings calculations were provided by the Washington Department of General Administration, State Purchasing Division. The savings were broken down by functional areas. Each area is assumed to save a specific fuel type. e.g., automobiles using gasohol save gasoline, heavy trucks save diesel fuel, etc. Dollar benefits were then calculated for each fuel type and totalled.

- Institutional Conservation Program (ICP)

This program provides financial assistance in the form of matching grants to aid several types of institutions in identifying and implementing energy conservation activities in their buildings.

The statewide savings that resulted from energy audits of about 3,300 Illinois school campuses under the federal ICP program was estimated to be $6,930,000 during fiscal year 1980. The energy saved was 2.518 trillions BTUs. In more relevant terms, the energy saved during 1979-1980 school year was

- the equivalent of 432,300 barrels of oil, which, laid end to end, would connect the capitols of Iran and Iraq; or
- would pay all the fuel and electric bills for about 200 Illinois schools for a full year.

Low-Income Weatherization

The need for a strong, effective low-income weatherization program has been even more pressing since the decontrol of oil, and is anticipated to increase substantially when natural gas is decontrolled. Expenditures on weatherization can decrease the future need for direct payments in the form of fuel assistance.

Although there were significant problems with the low-income weatherization program in earlier years, especially in the use of CETA labor, the program over the past few years has proven to be effective in getting homes weatherized. According to DOE studies, the program has weatherized 265,182 homes in FY 1980 at a cost of $182,082,673. This compares to FY 1979 figures of 118,200 homes weatherized and expenditures of $39,937,746. Production increased by 224% over FY 1979. The savings per dwelling are permanent savings. The equivalent of over 2 million barrels of oil will be conserved each year in the 860,000 weatherized so far through the DOE programs, saving $64.5 million in annual fuel costs.

The State of Maine, for example, has weatherized approximately 20,000 dwelling units or almost 1/3 the eligible low-income households in the state.

Recognizing the necessity for low-income weatherization in a state such as Maine which has a high percentage of low-income and elderly citizens, the state appropriated $1 million to add to the federal grants. If federal support had continued at the same rate, the state of Maine expected to reach the reamining 50,000 eligible homes within four years.

Although the Administration continues to propose that weatherization be continued as an allowable function under the Community Development Block Grant (CDBG) under HUD rather than as a separate program, they have once again failed to recommend additional CDBG funding. We fear that the low-income weatherization program would be severely cut back or perhaps lost entirely amidst the other responsibilities under the CDBG program if the Administration's proposal should prevail.

- Helping the Residential Consumer

In New Jersey, as well as in other states, false savings claims for flue dampers for home furnaces and boilers were widely advertised for almost a year until it was shown that the savings were mostly achieved by simple adjustments to boiler and furnace burners, rather than the $500 flue damper itself. As a result of New Jersey regulations requiring oil dealers to measure burner efficiency on an annual basis, homeowners can now achieve similar savings for a $10-20 fee, for the cost of the efficiency test. The $500 they would have spent on a flue damper can now be used more effectively on insulation, improved burners, or other proven conservation measures.

This is only one aspect of a comprehensive program in New Jersey to address the needs of the residential consumer. For instance, the Home Energy Savings Program offers all New Jersey occupants of one-to-four family dwellings an energy audit developed by the New Jersey Department of Energy and performed by trained utility and fuel dealer personnel as well as a variety of other conservation information. In the sixteen months the program has been in operation, 48,000 audits and 16,000 oil furnace combustion efficiency tests and 100,000 pieces of conservation literature have been delivered. The program was a precursor to the national Residential Conservation Service program in which almost all states are now participating.

The Plight of the Renter. Although we recognize that the market does indeed provide strong incentives for conservation, there are some cases in which market forces cannot work. For example, in most cases the market does not encourage landlords to make cost-effective energy improvements to their property. Most tenants in Minnesota pay their own heating bills. As fuel prices increase, it is the tenants, not the landlords, that are affected, but the tenants have no incentive to make improvements to a building they may occupy for a short time. In today's tight housing market, landlords that do pay the utility bills can easily pass these increases on to their renters. Even if landlords were prohibited from passing increases in energy costs on to their tenants, they would not make as many improvements as knowledgeable homeowners since they are able to deduct energy costs as operating costs and therefore do not feel the full effect of increasing prices.

Minnesota law requires residential rental property owners to make certain energy efficiency improvements if the improvements will pay for themselves in less than 10 years. Caulking and weatherstripping standards are now in effect and additional standards for insulation, storm windows, storm doors and positive fireplace shut-offs go into effect in 1983. The Energy Agency will be preparing materials to inform landlords what is required and how to calculate savings.

Estimated energy savings for Residential Rental Retrofit for 1981 are 2.36×10^{12} Btu.

o Computer Simulations of Supply Disruptions

As mentioned earlier in my testimony, preparing for energy shortages has been another major responsibility which has fallen to the states. Efforts by the Ohio Department of Energy to prepare for energy shortages illustrate the significance of state activity prior to an actual supply disruption. The Ohio Department of Energy has developed computer model simulations for supply contingencies which can be used to 1) test proposed energy emergency plans prior to their actual use; 2) monitor fuel supplies; and 3) improve the timing of curtailments during actual electric emergencies.

The Ohio DOE undertook a full simulation of a hypothetical supply interruption with representatives from all the major Ohio utilities. The scenario for the simulation was a summer coal supply interruption starting June 1, 1978. Summer peak load information, system burn rates, coal and non-coal generation, expected percentage conservation from each phase of the emergency plan and expected reduced levels of coal delivery were provided by the utilities. A computer code was developed to calculate state-wide normal and actual burn days for each utility. The code keeps track of daily coal deliveries and coal consumption, and estimates the day on which coal supplies will be exhausted. The model then calculates the desired trigger point for each curtailment measure and the coal savings from imposing each emergency measure.

The model and simulation has led the Ohio Department of Energy to revise its Electricity Emergency Rules. The same simulation program can be used on a real-time basis to inform all the Ohio utilities via computer linkup of current fuel status, conservation and curtailment levels, and to analyze various actions to avoid economic disruptions, including curtailment strategies and the need to purchase additional power.

This completes my testimony. Thank you for the opportunity to testify before you today. I will be happy to answer any questions you might have.

APR 7 1982

ACTION ENERGY PROGRAM
24 Elm Street, Gloucester, Mass. 01930

Director
281-4541
Weatherization
283-2131
Fuel Assistance
281-3900
Alternative Energy
Consumer Education
281-4040

[illegible] ENERGY AND NATURAL RES[illegible]
RECEIVED
APR 7 1982
[illegible] D.C. 205[illegible]

April 1, 1982

Senator James McClure, Chairman
Senate Energy Committee
U.S. Senate
Washington, D.C. 20510

Dear Senator McClure,

Please enter this testimony into your March 30, 1982 hearing record on Energy Conservation Programs. The Low-Income Weatherization Program has proven to be the finest example of potential federal responses to a national problem.

Thank you.

Elliott Jacobson, Director
Energy Program, Action, Inc.

Co-Chairman, New England Community
Action Association Energy Committee

EJ/jb

cc: Senator Lowell Weiker
Senator Paul Tsongas
Senator Edward Kennedy
Senator Warren Rudman
Congressman Nicholas Mavroules
Congressman Thomas P. O'Neil

ACTION INC.
Programs funded by CSA • DOE • DOL • HHS • NCAT • NERCOM

TESTIMONY

SENATE ENERGY COMMITTEE

CHAIRMAN: SENATOR JAMES McCLURE

Submitted March 30, 1982

Submitted by:

Elliott Jacobson,
Energy Director, Action, Inc.
24 Elm Street, Gloucester, MA

Co-Chairman, New England Community
Action Association

Mr. Chairman,

My name is Elliott Jacobson of Action, Inc. in Gloucester, Massachusetts. I am co-chair of the New England Community Action Association Energy Committee. I am submitting this testimony in an effort to express the committee's concerns about the Department of Energy's Lo-income Weatherization Program.

The D.O.E.-funded weatherization program is the only existing federal conservation program for poor and elderly people. It represents the total national effort to lessen the poor's dependence on non-renewable fuels and fuel assistance programs.

The successful D.O.E. program (Massachusetts reached 100% of its FY 81 quota in 5 months) is a product of years of development. Beginning with the CSA Energy programs of FY's 1976-78, the program evolved slowly, altering regulations, developing separate program accounts for consumer education, alternative energy, and implementing the fledgling crisis intervention program.

The transfer of weatherization (FY 78) to D.O.E. at first arrested the development of that program, as program administrators did not learn from the experience of CSA. However, as CAA program operators began to involve themselves in policy and regulation making the program began, by FY 1980, to experience remarkable gains. Production doubled every year from 1979 to 1981 culminating in the weatherization of 282,000 homes in FY 81. A Massachusetts study confirmed a $250/household savings with a payback period of 3.4 years. In Connecticut, the savings were$255 with a payback period of 2.5 years. These results project an annual national savings of 60 million dollars for the poor, that staysin their community to revitalize its economy. The savings are multiplied by the economic activity in paying labor, contractors, and buying materials locally for work that would not otherwise have been begun.

The ludicrous notion profferred in the administration budget rationale that, "the high level of private investment in energy conservation clearly show that state and local grant programs do not warrent federal support", avoids the financing dilemma that characteristically befall the poor. Without a nationally maintained delivery system, low-income energy conservation will return to its pre-Energy Crisis condition and the poor's dependence on cash programs will mushroom.

In the past three years, while fuel assistance funds have quadrupled, weatherization funds have been reduced by 25%. The need for fuel assistance at the minimum of 1.8 billion has been established. In Massachusetts , all Federal funds (76 million) have been depleted. Additionally, 17 million in state money will be dispensed by the end of the programmatic year, April 30. Only 5 million of the Federal Program were used for low-cost conservation measures, meaning that nearly 90 million in State and Federal dollars went to pay fuel bills. If there were no state programs, that degree of need would translate to 2.2 billion nationally, just for Fuel Assistance. Given the administration's request for 1.3 billion dollars for that function, it is incomprehensible that 15% could be skimmed for conservation. That policy would reduce available funds to 1.1 billion, or 50% of the need projected by the Massachusetts model.

In Connecticut, 10% has been set aside for weatherization, but as of April 1, 1982, plans to operate the program are incomplete. An operatin D.O.E. program, seperately funded would avoid additional unnecessary bureaucratic gymnastics as States attempt to balance dire short-term needs for fuel assistance and the long term solution of weatherization. In Vermont, 3% of the Fuel Funds were transferred to weatherization on January 1, 1982. The remaining funds will be transferred if they are not used by the end of the fuel program, clearly an unsatisfactory remedy for 90% of weatherization eligible clients. The State estimates it will take 25-30 years to completely satisfy Vermont's needs at the present rate of implementation.

Within my own Agency's jurisdiction, The Cape Ann, Massachusetts area, including 11 cities and towns, one can see the impact weatherization has had and the potential future ramifications of de-funding the D.O.E. program. In one city, Gloucester, a city of 28,000 people and 9,000 households there are 1,500 households receiving fuel assistance of an average of $600 totalling $900,000. Of these, 35% were elderly and 25% were working poor. In FY '81 we completed an average of 15 D.O.E. houses per month for the 5 months we were in full operation, bringing our Gloucester 4 year total to 300, leaving approximately 1200 housing units unweatherized. Those 300 units are using $60,000 less in fuel per year. If all low-income Gloucester housing was weatherized the savings would be $300,000 per year in potential fuel assistnace expenditures. An expanded program could complete 1,200 units in 3 to 4 years at a cost of under 1.5 million dollars in locally spent, community invested dollars. With an average Massachusetts payback of 3.4 years, the program would approximately pay for itself by its completion.

The energy price/supply situation is an international problem that American national policy has played an integral role. Continued instability in oil producing nations, compounded by natural gas deregulation insure periods of short supply at higher prices. All of these occurances are outside the control of the poor. The response of the poor will be to use less fuel, either by intelligent financed conservation or by threatening their children with malnourishment and their elderly with hypothermia.

Energy conservation was a national priority to be addressed by the windfall profits tax. Those monies have never been forthcoming in the quantity promised or to the ends that were initially addressed. Please do not abandon what is left of the effort to provide the poor and elderly a measure of relief from their physical and financial discomfort. Energy conservation is good social policy, good for international security, and cost effective.

ACEC File 430

american
consulting engineers
council

UNITED STATES MEMBER

1015 FIFTEENTH STREET, N.W., WASHINGTON, D.C. 20005 ☐ (202) 347-7474
Telex: 887445 AMCONENGRC WSH

March 31, 1982

The Honorable Lowell Weicker
Chairman
Energy Conservation and Supply
Subcommittee
United States Senate
Washington, D.C. 20510

Dear Mr. Chairman:

You recently held hearings on the federal energy conservation budget. There was a limited number of private sector witnesses mostly representing public interest groups.

Enclosed is a copy of the testimony we gave before Chairman Ottinger of the House Energy Conservation and Power Subcommittee on this topic. We ask that it be included as part of the hearing record.

The American Consulting Engineers Council represents over 3,800 engineering firms who are concerned and involved in energy conservation. Please consider some of the anti-competitive aspects of some of these federal programs. Ninety-eight per cent of our members are small businesses.

Regards,

Edward R Bajer

Edward R. Bajer
Director
Energy/Interprofessional
Relations

EB:dbw
Enclosure

President WILLIAM R. RATLIFF Mt. Pleasant, Texas • *Senior Vice President* DOUGLAS C. WOLFANGLE Bloomington, Minnesota
Vice Presidents H. S. (SONNY) HANSON Billings, Montana • MICHAEL A. HERTZBERG, Waitsfield, Vermont
FU HUA CHEN Denver, Colorado • LEWIS E. HOFFMANN Birmingham, Alabama • ROBERT C. MOORE Millburn, New Jersey
Treasurer DONALD J. SMALLY Sarasota, Florida • *President-Elect* RUSSELL L. SMITH, JR., Honolulu, Hawaii
Executive Vice President LARRY N. SPILLER • *Managing Director* BRUCE E. VOGELSINGER

TESTIMONY OF

DONALD G. CARTER
CHAIRMAN, ENERGY COMMITTEE

AMERICAN CONSULTING ENGINEERS COUNCIL
ON
THE DEPARTMENT OF ENERGY BUDGET FISCAL YEAR 1983
BEFORE THE
U.S. HOUSE OF REPRESENTATIVES ENERGY COMMITTEE
SUBCOMMITTEE ON ENERGY CONSERVATION AND POWER

MARCH 16, 1982

MR. CHAIRMAN, MY NAME IS DONALD CARTER. I AM A PROFESSIONAL ENGINEER AND PRESIDENT OF CARTER ENGINEERING LOCATED IN SILVER SPRING, MARYLAND. I AM HERE TODAY REPRESENTING THE AMERICAN CONSULTING ENGINEERS COUNCIL SERVING AS CHAIRMAN OF THEIR NATIONAL ENERGY COMMITTEE. MINE IS A SMALL BUSINES WHICH I BELIEVE IS NOT UNTYPICAL OF AN ENGINEERING FIRM IN THE ENERGY BUSINESS.

THE AMERICAN CONSULTING ENGINEERS COUNCIL (ACEC) IS A NATIONAL TRADE ASSOCIATION CONSISTING OF OVER 3,800 ENGINEERING FIRMS AND 50 STATE AND REGIONAL ORGANIZATIONS. TO BE A MEMBER OF ACEC, YOU HAVE TO BE A PROFESSIONAL REGISTERED ENGINEER. OUR MEMBERS ARE HEAVILY INTO ENERGY CONSERVATION. THEY PERFORM ENERGY AUDITS AND COMPLEX TECHNICAL ANALYSES FOR EVERY TYPE OF BUILDING RANGING FROM SINGLE FAMILY DWELLINGS TO HUGE INDUSTRIAL COMPLEXES.

THE ACEC DOES NOT VIEW A LESSER FEDERAL ROLE AS DETRIMENTAL TO THE CAUSE OF ENERGY CONSERVATION IN AMERICA. FEWER GOVERNMENT PROGRAMS AND LESS FEDERAL INVOLVEMENT REDUCE FEDERAL SPENDING AND GOVERNMENT REGULATION. ALSO, THERE IS NO QUESTION THE AVERAGE AMERICAN IS NOW MORE AWARE OF THE NEED FOR ENERGY CONSERVATION AND HAS BEEN TAKING STEPS TO CONSERVE ENERGY TO REDUCE UTILITY BILLS. THERE IS STATISTICAL EVIDENCE OF THIS IN DOE'S MONTHLY ENERGY REVIEW WHICH HAS BEEN SHOWING CONSISTENT DECLINES IN ENERGY CONSUMPTION.

THE PRIVATE SECTOR IS PROVIDING THE NECESSARY ENERGY CONSERVATION SERVICES AT ANY LEVEL WHICH THE RECIPIENT CHOOSES TO BECOME INVOLVED. ENGINEERS, ARCHITECTS, MECHANICAL AND ELECTRICAL CONTRACTORS, PLUMBING, HEATING AND AIR-CONDITIONING CONTRACTORS AND OTHERS ALL PROVIDE ENERGY AUDITING SERVICES.

CONSULTING ENGINEERS ARE INCREASING THEIR ROLE IN ENERGY CONSERVATION - AN AREA WITH GREAT MARKET POTENTIAL. IF YOU ASKED REPRESENTATIVES OF THE OTHER PROFESSIONS, WHOSE DAY-TO-DAY WORK IS SUPPLYING ENERGY CONSERVATION SERVICES, I BELIEVE THEY WOULD INDICATE INCREASED ACTIVITY BY THEIR MEMBERS IN THIS AREA.

ACEC IS EMBARKING ON A LARGE SCALE PROFESSIONALLY HANDLED PUBLIC RELATIONS PROGRAM TO EDUCATE THE GOVERNMENT AND PRIVATE SECTOR ON WHO AND WHAT CONSULTING ENGINEERS ARE AND THE SERVICES THEY PROVIDE. THIS PROGRAM IS DESIGNED TO REACH THE ENERGY CONSERVATION COMMUNITY FROM GOVERNMENT OFFICIALS TO SCHOOL AND HOSPITAL ADMINISTRATORS TO CORPORATION ENERGY MANAGERS. OUR POINT IS THAT THOSE WHO ARE SERIOUS ABOUT ENERGY CONSERVATION AND WANT PROFESSIONAL TECHNICAL ASSISTANCE CAN GET IT. THE MEMBERS OF ACEC ARE AVAILABLE AND HAVE THE CAPABILITIES AND EXPERTISE TO PROVIDE IT. MOREOVER, WE ARE DETERMINED THAT NO ONE SHOULD GO WITHOUT THE ASSISTANCE THEY NEED.

WE HAVE TAKEN OUT FULL-PAGE ADS IN MANY ENERGY RELATED PUBLICATIONS ANNOUNCING OUR ENERGY SERVICES AND LISTING FIRMS ALL OVER THE COUNTRY THAT MAY BE CONTACTED. WE INTEND TO CONTINUE THIS PRACTICE AND EXPAND TO OTHER PUBLICATIONS THAT WILL REACH THE WIDEST POSSIBLE AUDIENCE. IN ADDITION, OUR 50 STATE AND REGIONAL OFFICES HAVE AND ARE PRODUCING ENERGY DIRECTORIES TO BE DISTRIBUTED TO LOCAL OFFICIALS AND BUSINESSMEN. THESE DIRECTORIES WILL LIST LOCAL FIRMS INVOLVED IN THE ENERGY AREA. THE ENERGY COMMITTEE OF ACEC HAS PRODUCED A SLIDE SHOW ENTITLED "IF IT'S ENERGY, IT'S ENGINEERING" THAT WILL BE USED BY OUR MEMBERS FOR PRESENTATIONS BEFORE SCHOOLS AND LOCAL CIVIC GROUPS. THIS SHOW CONTAINS 102 SLIDES DEPICTING ENERGY CONSERVATION PROJECTS AND THE ROLE ENGINEERS HAVE PLAYED IN THEM. IT IS DESIGNED TO ENCOURAGE INVESTMENT IN CONSERVATION AND POINT OUT THE ECONOMIC ADVANTAGES. WE POINT THESE THINGS OUT TO SHOW HOW WE ARE RESPONDING TO THE NEED FOR ENERGY CONSERVATION.

MOST OF THE GOVERNMENT'S CONSERVATION PROGRAMS WERE SPAWNED BY THE ENERGY CRISIS WHEN CONGRESS PERCEIVED IT MUST ACT BECAUSE THE PUBLIC WAS SKEPTICAL ABOUT WHETHER A CRISIS ACTUALLY EXISTED. THE RESULT, IN OUR OPINION, WAS AN OVERREACTION AS EXEMPLIFIED BY THE MANDATORY BUILDING ENERGY PERFORMANCE STANDARDS (BEPS), THE RESIDENTIAL CONSERVATION SERVICE (RCS), THE COMMERCIAL AND APARTMENT CONSERVATION SERVICE (CACS), AND OTHERS.

IT IS NOW CLEAR THAT AMERICANS WERE NOT APATHETIC TOWARD CONSERVATION, HAVING TAKEN ALL DEGREES OF INITIATIVE TO FULFILL THEIR RESPONSIBILITY TOWARD ALLEVIATING AMERICA'S ENERGY DEPENDENCE. CONSIDER:

- IN 1981 THERE WERE MONTHLY ENERGY CONSUMPTION DECREASES IN COMPARISON TO 1980, ACCORDING TO DOE'S MONTHLY ENERGY REVIEW.

- ALSO IN 1981, THE OIL AND PETROLEUM PRODUCTS IMPORT RATE DECREASED BY ALMOST 25% FROM THE 1977 IMPORT RATE, ACCORDING TO THE NATIONAL ENERGY INFORMATION CENTER.

- ENERGY CONSUMPTION IN THE RESIDENTIAL SECTOR IS PROJECTED AT A ZERO GROWTH RATE IN THE LATTER PART OF THE CENTURY - DESPITE A 40% INCREASE IN THE NUMBER OF HOUSEHOLDS, ACCORDING TO A JULY 9, 1981 GENERAL ACCOUNTING OFFICE REPORT.

- ENERGY USAGE HAS RISEN FROM 10TH TO THE TOP PRIORITY FACTOR IN DETERMINING DESIGN OF BUILDINGS, THE WALL STREET JOURNAL HAS REPORTED.

THIS HARD EVIDENCE OF PUBLIC CONCERN IS COUPLED WITH ANOTHER FACTOR - AN INCREASINGLY INFORMED AMERICAN PUBLIC IS REALIZING THAT GOVERNMENT PROGRAMS AND MASSIVE EXPENDITURES OF TAX FUNDS DO NOT GUARANTEE CONSERVATION.

FEDERAL PROGRAMS LIKE RESIDENTIAL CONSERVATION SERVICE AND COMMERCIAL AND APARTMENT CONSERVATION SERVICE (CACS) INVOLVE GOVERNMENT SUBSIDIZED ENERGY AUDITS WITH THE FEDERAL REGULATIONS ON HOW TO PERFORM THEM.

OUR CONCERN IS NOT THAT INDIVIDUAL RESIDENCES AND BUSINESSES SHOULD NOT RECEIVE ENERGY AUDITS BUT WHERE THOSE AUDITS SHOULD COME FROM. THE MEMBERS OF THE AMERICAN CONSULTING ENGINEERS COUNCIL ARE IN THE BUSINESS OF PRIVIDING ENERGY AUDITS TO INDIVIDUALS, BUSINESSES, APARTMENTS AND INDUSTRY. HAVING UTILITIES REQUIRED TO PERFORM AUDITS IF REQUESTED BY THEIR CUSTOMERS IS NO LONGER NECESSARY BECAUSE OF THE THE AVAILABILITY OF THE PRIVATE SECTOR TO SUPPLY THESE SERVICES. THERE IS NO LONGER A NEED TO INSERT THE UTILITIES AS A MIDDLEMAN BETWEEN THE RECIPIENTS OF ENERGY AUDITS AND THOSE WHO PRIVIDE THE SERVICE. THAT IS WHAT THE RESIDENTIAL CONSERVATION SERVICE AND COMMERCIAL AND APARTMENT CONSERVATION SERVICE PROGRAMS DO AND RESULTS NOT ONLY IN ANOTHER LEVEL OF BUREAUCRACY BUT AN UNNEEDED PENETRATION OF THE GOVERNMENT INTO THE BUSINESS WORLD.

CONSULTING ENGINEERS AS WELL AS ARCHITECTS, MECHANICAL AND ELECTRICAL CONTRACTORS, PLUMBING HEATING AND COOLING, AIR-CONDITIONING CONTRACTORS AND OTHER ENTREPRENEURS PERFORM AUDITS AND TECHNICAL ANALYSES RANGING FROM SMALL BUILDINGS TO HUGE COMPLEXES. WE HAVE DONE THIS IN THE PAST SOMETIMES THROUGH FEDERALLY FUNDED PROGRAMS AND SOMETIMES IN COMPETITION WITH THEM.

THE ENERGY EXTENSION SERVICE HAS FUNDED THE TRAINING OF ENERGY AUDITORS WHO END UP IN COMPETITION WITH THE EXISTING POOL OF PRIVATE SECTOR AUDITORS.

A RECENT EXAMPLE OF GOVERNMENT COMPETITION OCCURRED IN THE SOUTH WHERE ONE OF OUR MEMBERS HAD A CONTRACT TO DO AN AUDIT ON A SHOPPING CENTER. THE TVA CAME IN AND OFFERED TO DO IT FOR NOTHING. THE ENGINEER WAS FORCED TO LET THEM OUT OF THE CONTRACT IF HE WANTED TO KEEP THEM AS A FUTURE CUSTOMER. THIS IS NOT AN ISOLATED CASE, THE ENERGY EXTENSION SERVICE IN CONNECTICUT WAS GIVING FREE AUDITS TO SMALL BUSINESSES MUCH TO THE DETRIMENT OF OUR FIRMS IN THE AREA THAT WOULD HAVE GOTTEN THAT BUSINESS. IT IS ALL WELL AND GOOD TO HELP STRUGGLING SMALL BUSINESSES BUT NOT TO THE DISADVANTAGE OF OTHER SMALL BUSINESSES. I MIGHT ADD THAT 98% OF THE 3,800 MEMBERS OF ACEC ARE SMALL BUSINESSES. WE UNDERSTAND THE TVA HAS A BACKLOG OF ENERGY AUDIT REQUESTS - NO WONDER IF THEY DO THEM FOR NOTHING. HOWEVER WE ARE ALL AWARE THAT THEY MAY AUDIT AT NO CHARGE BUT THEY ARE NOT FREE AS THE RATE PAYERS ARE BURDENED WITH THE COSTS.

CONGRESS IS RIGHTFULLY CONCERNED OVER WHO WILL FILL THE VOID CREATED BY THE ELIMINATION OF FEDERAL PROGRAMS. WE CONTEND IT IS BEING FILLED RIGHT NOW BY US ALONG WITH THE CONTRACTORS MENTIONED PREVIOUSLY.

ALSO NEW AND INNOVATIVE METHODS OF FINANCING ARE AVAILABLE TO ENERGY USERS WISHING TO CONSERVE. NOT OF MINOR SIGNIFICANCE IS THE FACT THAT THE ENERGY CONSERVATION MARKET IS PROVING TO BE A PROMISING ONE FOR NEW SMALL BUSINESSES.

THE NEED FOR A FEDERAL PRESENCE IN THE ENERGY CONSERVATION FIELD IS UNNECESSARY EXCEPT IN LIMITED CASES - SUCH AS LONG TERM RESEARCH AND DEVELOPMENT, MONITORING NATIONAL ENERGY USAGE, AND SUPPLYING RELIABLE INFORMATION ON THE RESULTS OF RESEARCH AND MONITORING. THIS COUPLED WITH PRIVATE SECTOR CAPABILITY AND COMMITMENT WILL ASSURE THE COUNTRY CAN SOLVE ITS ENERGY PROBLEMS. THAT CONCLUDES MY STATEMENT.

ISSUE/DESCRIPTION	HOUSE/SENATE/PRESIDENT	ACEC POSITION/ACTION
ENERGY		
Building Energy Performance Standards (BEPS): The original law required energy standards for all new buildings to be implemented by 1983. This is now a voluntary program with the government's role limited to research.	The BEPS, RCS and CACS programs have never been fully implemented. BEPS is now a voluntary standard, with the federal role limited to research. RCS has received funding for at least one more year, but attempts to repeal it and CACS will be made in the upcoming session of Congress. Statutory authority for CACS remains, but not funds.	ACEC supports energy conservation consensus standards in new and existing buildings, specifically the latest ASHRAE standards. ACEC opposes mandatory BEPS.
Residential Conservation Service, Commercial and Apartment Conservation Service: Would provide energy audits to all residences, apartments and small businesses that requested them.		ACEC supports S. 1171 and removal of RCS, and CACS energy audit requirements so audits can be performed without consumer-subsidized utility competition.
S. 1171 (Cochran, R-MS) would repeal authority for RCS and CACS programs.	SENATE: S. 1171 referred to the Energy Committee; no further action.	
Energy Extension Service: Provides grants to state energy offices that may be used for supplying free and below-cost energy conservation services.	The Energy Extension Service and Schools and Hospitals Retrofit Program are current ongoing grant programs that have survived program cuts so far, but will end up with scaled-down funding.	ACEC supports and is working for repeal of EES function that provides taxpayer-subsidized free energy audits and government competition with the private sector.
Schools and Hospitals Retrofit Program: Provides grants to states for energy audits, technical assistance and installation of energy conservation measures.		ACEC supports continued funding of the Schools and Hospitals Retrofit Program with more emphasis on technical assistance.
S. 1166 (Weicker, R-CT) creates an energy block grant to states, including the two programs just above, but at higher levels than the Reagan Administration.	SENATE: S. 1166 referred to the Energy Committee. Hearings held last spring, but no further action.	
S. 1544 (McClure, R-ID) repeals energy conservation entitlement programs and authorizes funds in an energy block grant to the states at lower levels to be used at their discretion for energy programs.	SENATE: S. 1544 was referred to the Energy Committee and may be used to expedite further cuts in the energy area.	ACEC supports repeal of programs that offer government competition with the private sector but would go even further to eliminate all funding that might encourage government competition.
H.R. 4163 (Tauke, R-IA) is similar to S.1544 except for slightly different funding levels.	HOUSE: H.R. 4163 referred to House Energy Committee; no further action	
H.R. 4039 (Moffett, D-CT) repeals some state conservation programs and requires each state to have an energy plan subject to federal approval.	HOUSE: H.R. 4039 referred to House Energy Committee; no action.	
ENERGY TAX CREDITS: There are over 60 different bills with variations on the type of energy apparatus included.	All bills dealing with taxes go to either the Senate Finance or the House Ways and Means Committee.	ACEC Energy Committee has proposed withdrawing support of energy tax credits. CONTACT: Edward Bajer
H.R. 5497 (Moorhead, R-CA) repeals RCS, CACS, BEPS research, appliance standards, Titles I and II of PURPA and other energy conservation programs.	H.R. 5497 referred to the House Energy Committee; no action.	

NATIONAL ASSOCIATION FOR STATE COMMUNITY SERVICES PROGRAM

WASHINGTON OFFICE:
Suite 251
Hall of the States
444 North Capitol St.
Washington, DC 20001
202/393-6438
CORPORATE OFFICE:
1712 Hampton Street
Columbia, SC 29201
803/758-3191

CHAIRPERSON
JAMES H. NORMAN
MICHIGAN

VICE CHAIRPERSONS
DAVID ENTIN
MASSACHUSETTS
ALICE A. HUFFMAN
CALIFORNIA

SECRETARY
CHERYL D. CROMWELL
FLORIDA

TREASURER
J. LEE SPRATT
SOUTH CAROLINA

April 7, 1982

Senator Lowell P. Weicker
Chairman, Subcommittee on Energy Conservation & Supply
Room 3204 Dirksen Senate Office Building
Washington, D. C. 20510

Dear Senator Weicker:

This association represents state agencies which administer the Community Services Block Grant program for low income persons. Many of these same state agencies also administer the low income home weatherization program, which is within the jurisdiction of your subcommittee.

Because of your time limitations, this association was not able to present testimony at your March 30 hearing on energy conservation programs, including home weatherization. If possible, we would like this letter to be included within your published record of that hearing. Meanwhile, we are asking our member agencies to provide additional information to you and other members of the Senate Committee on Energy and Natural Resources, to answer questions and concerns which were raised at the hearing. This statement will provide general information relating to state administration of the weatherization program. We expect that the individual state agencies will be able to provide much more specific and detailed information.

We wish to emphasize the following points:

1. There continues to be a need for a Federally funded weatherization program, in addition to the Low Income Energy Assistance Program.

2. Because of soaring fuel prices, the need for financial assistance in reducing fuel bills for low income citizens far exceeds funds available in the LIEAP program.

3. States welcome the flexibility in the LIEAP program which allows some of these funds to be used for low cost residential weatherization. However, two facts must be kept in mind: a) there is a substatial difference between low cost weatherization of this nature and the retrofitting and more costly weatherization which many homes require, and which are typically served under the weatherization program; and b) weatherization must be seen as more of a long range solution, which does not help a family over the immediate crisis of a large fuel bill which cannot be paid, and which may lead to a complete shutoff of fuel.

4. The "stop and start" nature of the weatherization program has seriously hampered efficient administration of state programs.

State agencies administering the LIEAP and weatherization programs are especially concerned over the suggestion that the needs of both programs could be met if they were folded together into one program, even with a 28% cut in LIEAP funds and the elimination of all weatherization funds.

If this were done, the only outcome would be a sharp reduction in both fuel assistance and weatherization for low income citizens.

As you know, approximately one year ago the Department of Energy made the decision to recommend termination of the weatherization program. No funds were requested for this program in the FY 82 budget. This led to a serious disruption in the program, and a virtual shutdown of weatherization progress in many states. Even though Congress did appropriate $144 million to continue the program as a part of the Continuing Resolution, it was not really until March, 1982 that states were able to resume anything approaching a normal program.

Now the states face the same situation again, with no funds provided in the President's proposed FY 83 budget. I am sure you realize the extreme difficulties this causes for state agencies which must maintain staff, identify eligible beneficiaries, lay out work schedules, and try to administer an efficient program.

An especially sensitive issue involves the matter of "carryover" funds. State agencies would like to be able to plan for the maximum production possible within the limits of their weatherization allocation. Yet, because of the "stop and start" nature of Federal funding, prudent managers must hold some funds in reserve. However, when they do this, they are sometimes criticized. It is said that they were not sufficiently zealous in pursuing their weatherization goals, or that they "didn't need the money," or it is even suggested that the carryover funds should be recaptured by the department and reallocated to other states.

State agencies are acutely aware of the severe funding stringencies which confront the Congress. They are appreciative of the flexibility they have been given to administer energy assistance and weatherization programs with a minimum of Federal regulation.

At the same time, these agencies are aware of both the tremendous human need which is there, and of the amount of energy conservation which can be accomplished through a well planned, responsibly administered program which offers both supplemental fuel assistance to pay urgent bills and sound weatherization to reduce future consumption.

These state agencies greatly appreciate the support you have provided for these programs in the past.

Sincerely,

William R Bechtel

WILLIAM R. BECHTEL
Executive Director

cc: Gary Barbour

NATIONAL ASSOCIATION FOR STATE COMMUNITY SERVICES PROGRAM

WASHINGTON OFFICE:
Room 251
Hall of the States
444 North Capitol St.
Washington, DC 20001
202/393-6438
CORPORATE OFFICE:
1712 Hampton Street
Columbia, SC 29201
803/758-3191

SPECIAL ENERGY REPORT

CHAIRPERSON
JAMES H. NORMAN
MICHIGAN

VICE CHAIRPERSONS
DAVID ENTIN
MASSACHUSETTS
ALICE A. HUFFMAN
CALIFORNIA

SECRETARY
CHERYL D. CROMWELL
FLORIDA

TREASURER
J. LEE SPRATT
SOUTH CAROLINA

April 12, 1982

ENERGY ASSISTANCE, WEATHERIZATION FUNDING UNDER SCRUTINY

Congress is sending mixed signals on how it will react to the Reagan Administration's proposals to sharply reduce funding for the Low Income Energy Assistance (LIEAP) program, and completely eliminate funding for the home weatherization program. In Senate and House hearings so far, members of Congress from both parties have generally denounced the Administration's proposals, and have indicated strong support for both energy assistance and weatherization. At the same time, supporters of these programs express concern that Congress, facing severe budget pressures on all fronts, might be tempted to cut back on energy assistance and weatherization if they feel that states don't really need the present levels of funding.

The Reagan Administration has proposed to reduce LIEAP funding from $1.875 billion for Fiscal Year 1982 to $1.3 billion for Fiscal Year 1983. The Administration has proposed no funding for weatherization in FY 83; for FY 82, Congress rejected a similar zero funding request and appropriated $144 million. The Administration's basic argument has been that, in terms of overall budget priorities, $1.3 billion appears to be adequate for LIEAP. As for weatherization, the Administration notes that "low cost residential winterization" is an eligible use for LIEAP funds. It has indicated that the Department of Energy no longer wishes to administer this program, and suggests that the two programs be combined under the $1.3 billion funding authority of the Department of Health and Human Services.

The Administration also has proposed, beginning in FY 83, that LIEAP payments to AFDC recipients be treated as income in determining eligibility for AFDC assistance and also for food stamps.

Although these proposals have been greeted with Congressional criticism which is astounding for its vehemence, this does not necessarily guarantee that the programs will be continued at their present separate levels of funding. At the same time that Congressmen have denounced the Administration proposals, some of them have been expressing concern, or at least a lack of understanding, regarding these questions:

1. Is a separate weatherization program necessary, or would it be more efficient to combine the two programs under HHS as the Administration proposes?

2. Do the substantial carryovers of funds from one fiscal year to the next indicate that the states either do not need as much as they are getting, or that they are not aggressively administering the programs?

3. Why are a majority of states planning to transfer funds out of the LIEAP program into other programs, such as the Social Services Block Grant program, under the transferability feature of block grants, if energy assistance funds are inadequate to meet the needs in most states?

States may find it hard to believe that such questions are being seriously considered. After all, it is the Congress that has established two separate programs, authorized carryovers of funds, and invited transfers from one block grant to another. Why should states have to explain something which was decreed by the Congress?

Nevertheless, these apparently are serious concerns. Congress itself often does not have as intimate knowledge of legislative history as one might assume. Congressmen deal daily with a tremendous variety of programs and issues. When they do deal with a program such as energy assistance or weatherization, it may be for only a few moments, and in the context of a committee hearing where a witness might throw out a startling statistic or an alarming anecdote — such as the fact that a majority of states are transferring funds out of the LIEAP program. Hearing such a statement without any explanation from administrators of the program may lead to snap judgments by Congressmen.

The National Association for State Community Services Programs has directed its staff to prepare special reports from time to time on issues relating to the LIEAP and Weatherization programs, and to provide special technical assistance to state agencies which administer these programs. This is the first such report. Efforts are being made to expand the Association's capability in this area. If you wish to subscribe to all future such reports, or if you need special assistance on an energy related issue, call the Association office in Washington at 202/393-6438.

STATES ENCOURAGED TO EXPLAIN ENERGY-RELATED DECISIONS TO THEIR DELEGATIONS

Block grants involve a partnership under which Congress provides all or most of the funding, while states take responsibility for program administration. Two problems already have been identified, however. First, under a block grant system, there is inadequate program data available to Congress. Committees accustomed to asking Federal officials about the administration of programs under their authority are already beginning to grumble about the lack of factual information available to them. Secondly, as noted above, Congressmen often misunderstand the need and justification for "flexibility" or "transferability" which is part and parcel of block grants. Some, such as Representative Broyhill (Rep., N. C.), have even used words such as "abuse," "gamesmanship," and "an attempt to siphon off more money from the Federal government" to describe state use of the transferability feature of block grants.

Because of the lack of regularly supplied data on block grant programs, it appears to be a necessary part of the block grant partnership for states to keep Congressmen and Senators informed on the administrative procedures used in these programs. It would seem desirable for states to regularly inform the members of their own Congressional delegations, as well as key members of authorizing and appropriations committees, as to how they are administering block grant programs at the state and local level. Especially important are understandable explanations for sensitive matters such as why some funds must be carried over from year to year, why funds are transferred from one block grant to another, and why the LIEAP program alone could not accomplish the goals of both energy assistance and weatherization.

Both this Association and the National Governors' Association plan to develop improved systems for gathering and communicating data on the administration of block grants. Until such systems are more fully developed, however, it is recommended that states make a special effort to respond to Congressional interest in these areas.

FUNDING LEVELS UNCERTAIN FOR ENERGY PROGRAMS

In general, both authorizing and appropriations committees in the House and Senate have indicated that they favor maintaining funding levels for Energy Assistance and Weatherization at or near the levels set in FY 82. However, Congressional consideration of budget levels so far has been in the broadest of terms, and has not focused on individual programs.

A Senate committee staff person, close to the process, said that Senators in both parties seem strongly supportive of Weatherization; however, he said he believed many Senators were thinking of a funding level of $50 million to $100 million for Weatherization, down sharply from the $144 million for FY 82. A comparable House staff person [illegible] that "the House would not go along" with such a reduction. On LIEAP, no specific estimates were offered be-[illegible] the belief that the figure would be higher than the Administration's $1.3 billion figure and somewhere in the range of the current $1.875 billion appropriation. However, the whole budget process is extremely volatile at the present time. Intense negotiations involving House and Senate leaders and the White House are centering on major questions such as how much to cut defense spending requests, whether to maintain the three year, 30% tax cut, whether to hold back on Social Security and other pension cost of living adjustments, and whether to make further cuts in discretionary social programs which were cut deeply last year.

A complicating factor is that individual appropriations bills may not be passed this year; instead, Congress may have to pass one or more "Continuing Resolutions" as a substitute for appropriations. Such resolutions often affect a large number of programs, and are subject to intense bargaining in Senate-House conference committees. When appropriations are handled in this manner, it becomes extremely difficult to forecast what will happen to any individual appropriation such as Energy Assistance or Weatherization.

REPUBLICAN SENATORS EXCORIATE ADMINISTRATION WITNESS ON ENERGY

A Senate committee hearing on energy conservation programs March 30 gave three leading Republican Senators a new opportunity to denounce Administration witnesses for allegedly failing to pursue energy conservation as aggressively as the Congress intended. The hearing was somewhat similar to a House committee hearing on March 4. The key administration witness at both hearings was Joseph J. Tribble, assistant secretary of Defense for conservation and renewable energy. Chairman of the hearing was Senator Weicker (Rep., Pa.), chairman of the Senate Subcommittee on Energy Conservation & Supply. However, it was Senator Percy (Rep., Ill.), sitting as a guest because of his role as chairman of the Senate Subcommittee on Energy, Nuclear Proliferation and Government Process, who led the assault on Assistant Secretary Tribble.

"You cannot be an effective advocate for a program that is mandated by law when you sit there and defend a 97% [illegible] in your budget," Percy said. He charged that Energy Secretary Edwards had gone back on his word not to cut energy conservation programs without consulting Congress. "They are phasing it out before Congress has had a chance to act," Percy said. "If I knew then what I know now, Mr. Tribble would never have been confirmed by our committee."

Senator Hatfield (Rep., Ore.), second ranking member of the full Senate Committee on Energy and Natural Resources (parent committee to Weicker's subcommittee), followed Percy, and accused Assistant Secretary Tribble and his department of "ineptitude, incompetence, arrogance, and total refusal to face up to the challenge of conservation." Hatfield called the department's record one of "failure — utter failure."

Hatfield called DOE leaders "the undertakers of energy conservation," and said: "I think it is an utter national disgrace what they are doing to conservation in this country. They are taking salaries under false pretenses when they call themselves conservationists."

Even Chairman Weicker seemed astonished at the fierce criticism. "You sounded like Lowell Weicker," he said to Percy. (Weicker is known as a maverick who does not hesitate to criticize the Administration.)

Tribble offered little defense beyond stating the Administration's basic position. "We propose to discontinue the building of expensive hardware for demonstration purposes, and to concentrate our activity on research," he said. Tribble contended that 95% of the conservation which has been achieved since 1972 has been because of the increase in the cost of energy, and that only 5% can be attributed to Federal programs. Tribble also said that the Lawrence Berkely Laboratory is preparing technical reports on weatherization which will tell everyone what they need to know. With this information, industry can build energy efficient buildings, he argued.

Tribble argued that the need for weatherization was enormous, and that the task of helping low income people accomplish it should rest with the Department of Health & Human Resources, not DOE. "There are some 12 to 13-million homes that now qualify for assistance under the Weatherization program, and to date this department has weatherized on the order of 800,000 homes," Tribble testified. "This would take a number of years. At the present time, the limit of expenditures per home is on the order of $1,000, so you can see that it would take a number of years and several billions of dollars to do the entire job....We feel that these grants should be handled through those agencies in the Federal government that are more familiar with dealing with grants to the lower income segment of society."

Weicker lashed back: "I found nothing in the explanation of you or your department which justifies, in effect, gutting the entire conservation effort of the nation." He demanded to know what would happen to the "11-odd million homes" which have not been weatherized.

Tribble replied: "We think that the funds that are available through HHS that can be used for that purpose, if the discretion of the states is such that it should be, would be the appropriate way for the Federal government to participate in this Weatherization program." He noted that, of the $1.3 billion the Administration is recommending for Low Income Energy Assistance, up to 15% could be used for Weatherization.

Weicker replied: "I believe you and this Administration are putting the neck of this country into a noose. The role of government, good government, is to anticipate crisis and not to react to it." Weicker said he would fight to continue the energy conservation programs and their appropriations.

John Gibbons, director of the U. S. Congressional Office of Technology Assessment, testified that there was an "enormous potential" for increased energy savings through weatherization. "We believe, Mr. Chairman, that the activities of this program could be doubled over several years, up to a rate of 60,000 per month, a rate which would weatherize over the coming decade more than half of the estimated 12 million poorly weatherized homes, at a budget that would be no more than 20 to 25% of the low income energy assistance budget that is on the book." Gibbons, responding to the suggestion that LIEAP could absorb weatherization, said: "There is a difference between sensible retrofit programs which typically cost $1,000 or more, and the low cost programs which provide only very temporary relief."

David H. Moulton, policy director for the Energy Conservation Coalition, stated: "Mr. Tribble testified that the level of weatherization now at the department is about 10-12,000 houses per month. That is about one-third of what they were weatherizing when the Administration took office. Although their budget has only been cut about 25%, so essentially you have a 66% drop in weatherization, a 25% cut in the budget, and there simply is either enormous waste or they are holding back funds."

EARLIER HOUSE HEARING SIMILAR; BROYHILL RAPS STATES FOR FUND TRANSFERS

A joint public hearing of two House subcommittees on March 4 produced similar testimony. However, highlight of the hearing seemed to be the extent to which states become targets of criticism under block grants, rather than the Federal agencies administering the program. At this hearing, Representative Broyhill (Rep., N. C.) repeated his criticism of states for diverting LIEAP funds to other block grants, and Administration witnesses used the "flexibility" argument to imply that current funding levels may not be needed.

Representative Ottinger (Dem., N. Y.),chairman of the House Subcommittee on Energy Conservation & Power, was presiding. Members of the House Subcommittee on Housing & Consumer Interests also sat in. Ottinger, like Percy, Hatfield and Weicker, blasted the Administration on both LIEAP and Weatherization.

"The Reagan Administration has proposed effective termination of Federal funding for the Weatherization program," Ottinger said. "It has proposed a reduction of 28% in funding for low income fuel assistance. These proposals are offered despite ample evidence that the programs are not large enough now to meet real human needs. While these callous proposals are the focus of today's hearing, we must remember that they are only one facet of the Administration's war on the elderly and low income Americans....I am encouraged only by the fact that, on energy assistance, Congress has repeatedly rejected the Administration's efforts to cast millions of Americans adrift. It rejected Administration efforts to eliminate Weatherization this year. I believe it will do so again."

Republicans joined Ottinger. Representative Claudine Schneider (Rep., R.I.) stated: "In 1973, it cost $300 to heat a home in Providence. Today, it costs $1500 and more. The impact on the elderly and on other families with fixed incomes has been devastating. The fuel assistance and Weatherization programs should be considered part of a basic promise that Congress made to the American people in exchange for the decontrol of oil prices. I believe the Weatherization program to be one of the most cost-effective investments ever made by the Federal government on behalf of the American people. Since the program's beginning, 63,100 homes in the New England region have been weatherized. This has resulted in an annual savings to these households -- using very conservative assumptions -- of $14.7 million. That compares very favorably to the $11.7 million budget for New England weatherization this year...The Administration's proposal to terminate this program is pennywise and pound-foolish. I intend to work with other members of Congress who believe in the Weatherization program to restore its funding. I feel confident that we will succeed."

Representative Cooper Evans (Rep., Iowa), calling himself a "fiscal conservative," said he strongly supported energy assistance and Weatherization, but was "bothered that Weatherization receives such a low priority in the proposed budget." While he said he did not mean to advocate cutting LIEAP funds, he seemed to believe a greater proportion of funds should be invested in Weatherization.

Despite the furious assault, Administration testimony was formal and restrained. Linda S. McMahon, associate commissioner for family assistance in the Department of Health & Human Services, testified: "The Department has left the maximum possible policy discretion to States, territories and tribes. Our approach is to allow grantees to design and operate energy assistance programs suited to their own particular needs and priorities. ....States may roll over up to 25% of their allotment for use in the next fiscal year....States may transfer up to 10% of their energy assistance grant to other HHS block grants....From information in state plans submitted to us, and from recent surveys by the National Governors' Association and National Consumer Law Center, we believe 26 states will transfer funds out of the energy assistance program. I am not aware of any states that plan to transfer funds from other block grants into the energy program. The authority for states to use up to 15% of the funds available under this program for low cost weatherization and energy related home repair is another important way the block grant approach provides states with needed flexibility. At least 37 states have indicated to us that they plan to use some of their energy assistance block grant money for weatherization activities."

Even more "flexibility" will be provided in the future, McMahon testified. The Administration proposes to fold the AFDC emergency assistance program into the LIEAP program. (This is a small program operating at about $40-million per year, which provides aid such as emergency shelter.) "This will give states more latitude in dealing with crisis situations," McMahon testified. "We will propose eliminating restrictions placed on states' operation of their energy programs. Finally, we will propose changes to simplify Federal administrative requirements, allowing us to reduce Federal administrative costs by 27%."

Representatives Schneider and Ottinger demanded to know how the LIEAP budget could absorb energy assistance, Weatherization, and AFDC emergency assistance, and still be cut from $1.875 billion to only $1.3 billion.

"Based on the money left over from the previous year, we calculate that $1.3 billion is adequate," McMahon said. In addition to mentioning the carryover money, and the transferability features, McMahon also said that the money would go farther because of better "targetting" on the needy. "Our purpose is to see to it that the funds are targeted on those who are most needy," McMahon testified.

(However, a spokesman for the National Consumer Law Center, familiar with the draft legislation to carry out the administrative procedure changes McMahon referred, stated that this bill would "gut the assurances" in the law which insure equitable treatment for low income people and protect the intent of the program.

McMahon's testimony on carryover and transfers of LIEAP funds to other programs apparently stirred up Representative Broyhill (Rep., N. C.), who repeated charges he made earlier on the House floor. "Certainly I sympathize with all of the problems that people are facing these days," Broyhill stated at the hearing, "but I'm also concerned about the potential for abuse in the fuel assistance program. We keep hearing reports that funds are going to people who do not qualify for the program. Also we are concerned about states utilizing options under the program and engaging in sort of a gamesmanship in an attempt to siphon off more money from the Federal government. In reality, these monies are going to some other programs. What we really have is a truth in advertising problem." Broyhill cited incidents in North Carolina in which he said people in publi housing or university dormitories got fuel assistance payments.

McMahon said the department would "disallow those costs." As for block grant transfers, she said the Admin tration had requested that feature, and thought it was desirable. But Broyhill replied: "A number of state were saying they needed funds for fuel assistance when in reality they were going to transfer those funds to other programs. In other workds, they were coming in here asking for supplemental appropriations to fund thi program, yet in reality they were intending to spend those funds somewhere else. It just seemed to me this w not the proper way to fund this kind of a program ...If they had legitimate needs in the other program, let's address those, and let's talk about supplemental appropriations for those particular needs, instead of saying we need it for fuel assistance, knowing all along they are going to spend it somewhere else."

McMahon responded that if citizens were concerned about these matters, they should complain to Governors and legislators. She said HHS would audit the state-administered programs.

This hearing also was highlighted by a sharp, and unresolved argument, over whether states had run out of Weatherization money during the past year; by moving testimony from elderly, low income citizens who had received energy and weatherization aid, and testimony by David Entin, Massachusetts, representing this Association. (Entin's testimony was reported in an earlier edition of this Association's newsletter -- March 8, 198

A COMMENTARY ON THE HOUSE AND SENATE HEARINGS -- by the Association staff

The March 30 Senate hearing and the March 4 House hearing brought out almost passionate support for energy assistance and Weatherization, and almost unanimous rejection of the Administration's negative recommendations. Presumably, that appears positive to program managers and those who benefit from the program. However, there was a lot of sound and fury and very little really substantive discussion at both hearings. No one wants to oppose heating the homes of the poor and elderly in a bitter winter. Everyone seemed to agree it was "pennywise and pound-foolish" to kill Weatherization and continue sending more than a billion dollars a year in tax funds up the chimney. But beyond blasts of angry rhetoric, no one at the hearings suggested how to determine reasonable budgets for these programs, or how to improve their administration. The Reagan administration's only answer is to turn more and more of the responsibility over to the states (with less and less money). The backlash which this creates became obvious at the hearing. The Federal administrators simply don't have detailed facts on program administration to answer Congressional questions. The impression is left that, if there are problems in the program, it is the fault of the state administrators. A Congressman has no idea how to get at such a problem, and may react by turning against the program or at least against the concept of state administration. "Carryover" and "transferability" are explosive concepts. Even stanch supporters of these programs are reportedly concerned at Broyhill's statements, and reports of 25% carryover infuriate Congressmen who thought these programs were overwhelmed with demands for help. If a new Administration bill seeks to wipe out limits on carryover and transfers, while reducing the presently required "assurances," Congress will certainly react negatively. States which have pleaded for flexibility must now see how this can be used to undercut their funding, with Administration witnesses arguing that three programs, funded at $1.875 billion, $144 million and $40 million (a total of $2.059 billion) can be folded into one, funded at $1.3 billion, and that this will "give the states more latitude in dealing with crisis situations."

NETWORK OF ORGANIZATIONS BACKS ENERGY PROGRAMS

The House and Senate hearings brought out a number of organizations which support energy assistance and Weatherization programs. Some of these groups may be able to assist states in administering the program. For example, one person who follows the programs very closely, in behalf of low income citizens, is Carol Werner, National Consumer Law Center, 236 Massachusetts Ave. N. E., Washington, D. C. 20002. 202-543-6060. Another is John G. Buckley, Northeast Coalition for Energy Equity, 1700 Pennsylvania Ave. N. W., Suite 300, Washington, D. C. 20006.

CONGRESSIONAL COMMITTEE JURISDICTION IS BADLY SPLIT

A major problem for states in energy programs is that Congressional jurisdiction is badly divided among many House and Senate committees. Most programs have one authorizing and one appropriations committee (or subcommittee) to deal with in each House. Energy programs are almost unique in that they cut across various jurisdictional lines.

As far as appropriations goes, the key LIEAP committees are: Senate Subcommittee on Labor-Health & Human Services-and Education, chaired by Senator Schmitt (Rep. N. M.) Republican members are Schmitt, Hatfield, Weicker, Stevens, Andrews, Abdnor, Rudman and Specter. Democratic members are Proxmire, Byrd of W. Va., Hollings, Eagleton, Chiles, Burdick and Inouye. And the House Subcommittee on Labor-HHS-Education, chaired by Representative Natcher (Dem., Ky.) Democratic members are Natcher, Smith of Iowa, Obey, Stokes, Early and Dwyer. Republicans are Conte, O'Brien, Pursell, Livingston and Porter.

For authorization (not required this year either for energy assistance or Weatherization), jurisdiction is split amoung the House Ways & Means committee, House Education & Labor committee, and the House Energy & Commerce committee. The Senate authorizing committee for LIEAP is the Senate Labor & Human Resources committee.

Weatherization appropriations are handled by the Senate Subcommittee on Interior & Related Agencies, chaired by Senator McClure (Rep., Idaho), and the House Subcommittee on Interior, headed by Representative Yates (Dem., Ill.) Authorization for Weatherization is handled by the Senate Energy and Natural Resources committee, chaired by Senator McClure. In the house it is split between the House Committee on Banking, Finance and Urban Affairs, chaired by Representative St. Germain (Dem., R. I.), and the House Energy & Commerce committee, chaired by Representative Dingell (Dem., Mich.)

COUNTING LIEAP AID AS AFDC INCOME WILL HAVE A MAJOR EFFECT

Little attention has been directed to the Administration proposal to count LIEAP assistance as income in calculating eligibility for AFDC and food stamps. Lou Glasse, commissioner of the New York State Office on Aging, charged at the March 4 House hearing that this amounted to "using the program to cut welfare costs instead of helping to pay fuel bills." She said, "If LIEAP assistance were to be counted as income for determining eligibility for food stamps and AFDC, in direct contradiction to last year's reconciliation act, the subjugation of LIEAP to public assistance costs would be complete." Carol Werner, National Consumer Law Center, testified at the House hearing that studies indicated that AFDC recipients would simply lose, "dollar for dollar," any assistance they got for fuel costs under such an arrangement. In food stamps, she said, it appeared recipients could lose up to $5.25 for every $10 benefit they received.

OHIO ASSOCIATION OF COMMUNITY ACTION AGENCIES
~~33 North High Street, Suite 813~~ / Columbus, Ohio 43215 / (614) 221-4657
21 East State St., Ste. 810

JOHN T. DEMPSEY
Executive Director

CURTIS A. BROOKS
President

DONALD F. STRICKER
First Vice President

ANTHONY MELE
Second Vice President

ROSETTA HICKMAN
Secretary

JACQUELINE FRANCIS
Treasurer

RGY AND
APR 7 1982
D. C. 20510

April 5, 1982

Hon. James McClure, Chairman
Senate Energy Committee
Dirksen Office Building
Washington, D.C. 20510

Attention: Gary Barbour

Dear Senator McClure,

I would greatly appreciate having the enclosed written testimony entered in the record of the Energy Committee's March 30, 1982 hearing on the DOE Weatherization Assistance Program.

Thank you very much for your consideration.

Sincerely,

Andrea D. Lentz
Administrative Director

cc: Senator Metzenbaum
Meg Power

Mr. Chairman, Members of the Committee:

I am Andrea Lentz, Administrative Director of the Ohio Association of Community Action Agencies. On behalf of the Association, I respectfully submit the following written testimony regarding the Department of Energy Weatherization Assistance Program.

Ohio's local weatherization program operators, most of whom are community action agencies, are uniformly committed to the maintenance of a separate, categorical weatherization assistance program. This commitment arises first from a firm belief that the program is necessary and effective; and secondly from the regrettable but practical perspective that the only way to continue the program, at present, is through federal initiative.

Weatherization is a logical, cost-effective way to reduce residential energy waste among the nation's poor. As such, it increases the country's energy options and reduces the demand for low-income energy assistance funds. In Ohio alone, the cumulative program will save an estimated five million energy dollars during 1982. The program's impact on employment, manufacturing, and low-income household purchasing power, of course, adds considerably to this total.

Weatherization's impact on the economic health of northeastern and midwestern states is widely recognized. In Ohio, the Governor in concert with the Legislature commissioned a study in 1981 through the State Weatherization and Home Energy Policy Advisory Committee (WHEPAC), which showed an average nineteen percent energy saving per home weatherized. Increased materials allowances and improved skills training according to Ohio's extensive state installation standards (developed by WHEPAC) have magnified the average savings on homes weatherized since the survey was performed.

Ohio's legislature has recognized the importance of weatherization by providing supplemental labor funds for skilled workers (1979-81) and mandating that the full fifteen percent allowance under the Home Energy Assistance Block Grant (HEAP) be transferred to the State Office of Weatherization.

Combined DOE and HEAP funds in 1982 will allow us to operate the program at a level slightly higher than that of 1981. State labor funds, however, have been terminated due to Ohio's continuing fiscal crisis. We cannot hope that the State will be the source of additional revenue for weatherization in the near future. Similarly, CETA labor cutbacks have caused us to expend increasing proportions of program funds for support rather than materials. Between January 1981 and August 1981, CETA labor fell from 27% to 12% of the Ohio weatherization workforce, with additional cuts coming. State labor comprised 38% of the labor force in August, while 50% of the workers were paid with DOE funds. With the termination of state labor funds and the CETA cuts since August, HHS/DOE has had to assume approximately 90% of the labor payments under the program. As a result, we anticipate that completions in 1982 will approach 8,500 rather than the 10,500 completed in 1981.

Clearly, then, federal cutbacks in other programs are adversely affecting Ohio's ability to maintain weatherization at its previous level despite the widespread public and private support for the program. The state legislature right now is wrestling with the need to increase our taxes once again; Ohio unemployment is second-highest in the country; our educational system is in jeopardy; our poor need food and shelter, of whatever kind; our roads, on which so much of our transportation economy depends, are deteriorating. In this climate, the ability to plan for long-range solutions and to fund programs that will yield cumulative benefits in the future rather than widespread benefits immediately, is a luxury that Ohio simply does not have within its own resources. We must look to the federal government to provide the essential nucleus of guidance and direction for weatherization and other long-range programs, and to provide the necessary monetary incentives for this investment in the future. The philosophy of investment incentives has been applied by the federal government to the individual income tax structure. We respectfully suggest that this same philosophy should be carried over to state economies through categorical programs that would otherwise be neglected or dismantled because of the states' immediate need for basic economic survival. Weatherization is a preeminent example of this type of program.

Even with categorical designation and funding, this year's efforts will be complicated by the need to combine HHS and DOE funds into a single coherent program, with full accountability to both funding sources. Part of Ohio's DOE funds may indeed be jeopardized because our 1982 completions prior to DOE approval of the state plan, which have been achieved with HHS funds, may not be eligible for DOE reimbursement. Our full production schedule and activity level therefore may not be reflected in DOE's mid-year production evaluation, on which additional funding allocations are based. In short, our efforts to construct a program based on steady staffing and production throughout the entire calendar year have been severely hampered by the requirements of our different funding sources.

Our recommendations regarding the weatherization program, therefore, are as follows:

1. That Congress recognize the importance and effectiveness of the Weatherization Assistance Program, and the need for federal incentives to continue the program, by retaining it as a separate categorical program, administered by a single federal entity.

2. That a total of at least $400 million be appropriated for the FY 83 categorical weatherization program, with the amount exceeding the present FY 82 DOE program appropriation to be deducted at the national level from the Home Energy Assistance Block Grant (HHS) and transferred to the categorical weatherization appropriation.

3. That, in the event that another federal entity besides DOE is assigned responsibility for the categorical weatherization program, continuance of existing service delivery mechanisms (which are now delivering quality workmanship at ever-increasing production rates,

and are accustomed to dealing with the federal program regulations as well as with the low-income population) be mandated in the new legislation.

Thank you for your time and consideration. Should you wish more information about the Ohio perspective and/or Ohio's program record, please do not hesitate to contact us.

FINAL VERSION
OF THE
WRITTEN COMMENTS SUBMITTED TO THE
U.S. SENATE
ENERGY AND NATURAL RESOURCES COMMITTEE
SUB-COMMITTEE ON CONSERVATION AND SUPPLY

IN REGARD TO THE MARCH 30, 1982 HEARING
ON THE FISCAL YEAR 1983 ENERGY CONSERVATION BUDGET

COMMENTS SUBMITTED BY:

Mr. Bradford S. Chase
Acting Under Secretary for Energy
State of Connecticut
Office of Policy and Management
Energy Division

April 5, 1982

Amended: April 12, 1982

WRITTEN COMMENTS SUBMITTED TO THE U.S. SENATE SUB-COMMITTEE ON CONSERVATION AND SUPPLY OF THE ENERGY AND NATURAL RESOURCES COMMITTEE

Submitted By: Bradford S. Chase, Acting Under Secretary for Energy,
State of Connecticut, Office of Policy and Management,
Energy Division

Submitted: April 5, 1982
Amended: April 12, 1982

IMPACTS OF PROPOSED FY '83 BUDGET CUTS

In the past two years, there has been a dramatic shift in energy policy from what it was in the latter half of the 1970's decade. From 1976 through 1980, federal policy established a significant federal and state presence aimed at reducing oil dependence, and intensifying conservation efforts. Since that time, federal policy has been directed at dismantling this federal and state capability, and relying instead on energy exploration and increased production, and allowing the marketplace to allocate energy resources and determine prices.

This change in federal policy is of grave concern in Connecticut because of what it signifies in terms of the federal/state partnership for dealing with our energy problems, and in terms of its impact on the state initiatives. To understand these issues, a brief overview of the Connecticut energy situation is presented. This is followed by an outline of the impacts on state government capacity and activity.

CONNECTICUT ENERGY SITUATION

Each year in Connecticut, the equivalent of 126 million barrels of oil is consumed for all energy requirements. Petroleum products actually constitute 71% of that total, followed by nuclear fuel at 19%, and natural gas at 9%. All other fuels combined make a very small contribution to our fuel mix. This contrasts sharply with the national pattern where oil constitutes only 47% of the mix, natural gas 26%, and coal 19%. Hydropower, followed closely by nuclear, together represent most of the remaining energy sources.

None of the major fuels used in Connecticut are produced in the state. In 1980, the total annual energy cost reached $4.4 billion, with $2.9 billion of that money being exported to other states and countries. These billions of dollars could otherwise have been invested in Connecticut's economy. Production, distribution, marketing, and pricing decisions for oil, natural gas, coal and nuclear fuel occur for the most part outside Connecticut's borders.

The current energy supply environment is much more optimistic than a few years ago. U.S. energy demand has declined 5% in the last two years. 1981 oil imports were down 13% from 1980 levels. But our fundamental problems of imported oil dependence and vulnerability of much of that supply persist. Connecticut's larger petroleum dependence implies greater vulnerability than for the nation as a whole.

One of the most serious dangers we face is to let complacency cause us to lessen our commitment to reducing energy consumption. We should continue to use energy efficiently and to replace oil with alternative sources. That commitment remains the cornerstone of Connecticut's energy policy, but a strong consistent federal policy and financial support are essential to sustaining state and local efforts.

ECONOMIC AND SOCIAL IMPACTS

Current federal energy policy relies on the marketplace to obtain the most efficient combination of energy production and consumption. This policy fails to recognize that significant segments of the economy are unlikely to implement conservation or renewable resource measures under the impetus of market forces alone. Rental units constitute 30% of the state's housing stock and are often older, less insulated structures. The bulk of fuel assistance recipients live in this older housing stock. Conservation improvements in this area will require incentives beyond market forces.

If oil prices continue to decline in the short run, market forces may act to reverse conservation habits and discourage investment in conservation, new technology and oil alternatives. This may be contrary to long-term security and market stability.

State-sponsored conservation programs target these situations and attempt to reduce petroleum vulnerability and promote a more diverse fuel mix. This contributes directly to national security, but receives no allocation within the proposed federal budget. Contrast this to the expanded fiscal resource commitment to defense which will do little to enhance national security in the energy area.

The elimination of federally-supported conservation programs will make it more difficult to reduce the energy needs of low-income families. The Public Information program, through its one-on-one approach, has been successful in promoting conservation among low-income households. The weatherization program for low-income households is also slated for reduction or elimination. The argument for this change is that the funding for a DOE-type weatherization program is available through the energy assistance block grant. This argument is fallacious from two perspectives. First, the block grant program disallows any conservation measure that goes beyond the low cost/no cost definition. Second, the block grant is proposed to be cut by more than 25%, virtually eliminating the opportunity to pay for weatherization activities.

Given a 25% cut in the energy assistance block grant program in FY '83, Connecticut will have to either reduce its benefit levels, or reduce the number of households it can serve. This situation is made worse by the thrust of other federal initiatives and resultant cuts in other social service programs, which leads to great need and participation in the energy assistance program.

CONNECTICUT ENERGY DIVISION IMPACTS FROM FEDERAL BUDGET CUTS

The FY '82 federal budget, and proposed FY '83 federal budget represent a collapse of support for the state-level efforts and capabilities developed carefully since the 1973 oil embargo.

During FY '82, the loss of half of our federal funding, over $1 million, resulted in a one-third reduction in Energy Division operations. Programs aimed at reducing transportation sector use of fuel were eliminated, as were programs for fuel oil dealer training, technical services for citizens, and oil recycling. The petroleum allocations and set-aside programs ceased. At the same time, renewable resources programs, energy information and outreach services, and commercial/industrial conservation programs were curtailed.

The proposed FY '83 federal budget will cut out the remaining $1 million in federal funds. The remaining, renewables, education, outreach and conservation programs will be eliminated. While the state has made a large commitment to supporting energy activities, $1.2 million in FY '83 for the Energy Division, the state will not be able to make up for the federal $2 million lost in two years. This dismantling of staff has impact well beyond the programs immediately affected, to the full range of policy and emergency preparedness responsibilities of the Energy Division by eliminating expertise and experience in specialized areas.

At issue is state level capacity in the whole energy area. At stake is all the states' abilities to exercise leadership roles in dealing with energy problems and developing a more secure energy future.

STATEMENT FOR THE RECORD

WILLIAM U. CHANDLER
ENVIRONMENTAL POLICY CENTER

HEARING ON 1983 BUDGET PROPOSALS
ENERGY CONSERVATION PROGRAMS
U.S. DEPARTMENT OF ENERGY

BEFORE THE

SUBCOMMITTEE ON ENERGY CONSERVATION AND SUPPLY
U.S. SENATE

MARCH 30, 1982

> It's the naive and foolish idea
> that the oil crisis is over
> and OPEC's days are numbered.
> These are dangerous illusions;
> we entertain them at our peril.
>
> --Forbes, March 15, 1982

The Great Oil Swindle of 1982

The cover of Forbes, March 15, 1982, issue is entitled "The Great Oil Swindle of 1982". The article warns that "...if OPEC wanted to lull its victims into a vulnerable complacency, it could hardly do worse than encourage the notion that the world was choking on oil." (1) Congress should heed this warning as it considers Ronald Reagan's plan to eliminate federal energy conservation programs. For without energy conservation, "we will be too cold in the winter, too warm in the summer, and a good deal poorer in the bargain." (2) And we will have swindled ourselves out of the one means we do have of reducing our vulnerability to the oil weapon.

At best, administration energy policy is inconsistent. We are told, on one hand, that the government should not interfere in the marketplace by promoting conservation, and on the other that "...the nuclear industry is weak and requires a government presence to put it on a stronger footing."(3) Direct subsidies for the nuclear industry would, if Reagan got his way on the 1983 budget, total 50 times as much as for energy conservation. Yet, conservation last year saved 6 times as much energy as nuclear power produced.(4,5) Not only is energy policy being applied inconsistently, but without regard to reality.

This testimony is delivered in support of certain Department of Energy (DOE) energy conservation programs, and others under the jurisdiction of the

Environmental Protection Agency (EPA). Many of these agencies' energy conservation programs have been successful and deserve continuation, and a few do not deserve support. We endorse successful programs for the "commercialization" of energy conservation, such as the highly praised Office of Industrial Programs, with the caveat that we, too, prefer to leave the demonstration of existing technology to the marketplace, but object to the termination of conservation programs while energy supply subsidies such as the Clinch River Breeder Reactor Project and the Synthetic Fuels Corporation exist. At least the conservation efforts work.

Conservation: Cause and Effect

Oak Ridge Natonal Laboratory (4) recently published an explanation of how well energy conservation is working, and why. ORNL estimates that the U.S. now uses 10 quadrillion BTU (quads) less than it would without conservation. The laboratory attributes 80 % of this savings (a portion equal to 4 million barrels of oil equivalent per day) to price response, and the rest, about a million barrels of oil equivalent per day, to government programs, including auto fuel economy standards, industrial information programs, the Residential Conservation Service, and so on. The savings to the U.S. economy due to these programs totals $12 billion per year. This means that the DOE conservation programs have a payback of one month.

But the drastic decline in oil imports masks some very bad news. Not only is the recession largely responsible for the 40 % drop in total imports (as opposed to Middle East imports, which have almost doubled since just before the 1973 oil embargo), but much of the rest of the reduction is due to a drawdown of what had been a very large private stockpile of crude oil and refined oil products. This drawdown coupled with the absence of a sizeable government owned stockpile increases our vulnerability greatly. A "well-placed bullet in Saudi Arabia" not only would evaporate the oil glut, it would exhaust our oil reserves in a few months.

ORNL's research and articles like Forbes' discredit claims by the Department of Energy, particularly W. Kenneth Davis, Deputy Secretary of Energy, that energy price increases have brought about 95 % of conservation.(6) There is no analysis which supports this rhetoric.

When economic recovery takes the slack out of the world oil market, we again will be subject to the whims of OPEC. Cutting conservation programs now would certainly be false economy; we would pay many times over for higher priced oil and diminished security.

The Energy Conservation Budget

The remainder of this testimony will evaluate selected federal energy conservation programs in each of the principal energy consuming sectors. This is by no means an exhaustive evaluation, particularly since others will provide this committee with information on the importance of buildings sector research and on the grants programs. (See Table 1.)

The Transportation Sector

Certification of Automobile Fuel Economy

Automobile fuel economy standards probably have saved more oil than any other federal energy conservation effort. Some have claimed that the auto is the energy crisis, since it alone consumes more oil than we import.(7) Motor gasoline is by far the largest portion of product produced from oil. (See Figure 1.) Administration of fuel economy standards is cheap, and the result cost-effective for consumers. Many argue that the standards have saved Detroit from losing an even greater share of its market to Japan. It is particularly troubling, then, that the certification of fuel economy standards compliance may be frustrated by budget and personnel reductions. We estimate that the EPA staff positions responsible for fuel economy certification have been reduced by 30 to 40 % since 1981.

Fuel Economy Ratings: A Change For the Better?

The EPA measurement of auto fuel economy grossly overstates the mileage most cars actually provide. This occurs because Congress stipulated that a certain fuel eonomy test, not really appropriate for accurate measurement, be used. A change in the rules governing the test measuremtn could make the fuel economy rating assigned each car model much more realistic, however, and 18 months ago EPA proposed such rule changes. These changes have been languishing in EPA too long now; they should be announced and duly enacted.

The Gas Mileage Guide For Cars

A booklet reporting the fuel economy of all new cars for sale in the U.S. is required by law.(8) The Gas Mileage Guide, as this booklet is called, would be eliminated by the Reagan administration, despite the fact that it is the source of information on fuel economy most heavily relied upon by consumers. Elimination of the Guide would save only $1 million per year, or .001 % of the 1983 deficit. We must object to this example of false economy, not to mention disregard for the law.

The Fuel Economy of Tires

Last year, the Environmental Policy Institute brought national attention to the fact that some auto tires will save gasoline: as much as 40 gallons per car per year. (9) (See Table 2.) By listing the efficiency of tires by manufacturer and model, EPI provided information that could ultimately result in a savings of 400,000 barrels of oil per day. This information could not have been published, however, without research conducted by EPA. EPA originally planned to publish this information itself, but was constrained from doing so by budget cuts. Moreover, EPA's inexpensive testing of tires--costing only $100,000 per year--will soon be ended by further budget cuts. This again is false economy.

What is needed is legislation making information on the fuel efficiency of tires more accessible to consumers--a requirement that each tire be rated and the rating molded right into the tire.

The DOE Transportation Research Budget

DOE transportation sector research and development, unfortunately, is misdirected. Programs for the development of alternative auto engines would at best produce engines no more efficient than gasoline or diesel engines using existing technology. Development of an electric vehicle would result in a switch to an extravagantly inefficient vehicle, and would require the costly development of electric power capacity.

Transport Trucks

Too little R and D has been done in freight transport, especially on transport trucks. Trucks are the least efficient freight transport mode: they use half of all fuel used for moving freight, though they carry only a quarter of all freight, by weight.

The Industrial Sector

There are two primary reasons why DOE's industrial energy conservation programs deserve support: one, they work, and, two, they would not be undertaken by private industry.

U.S. industry has "the most inefficient (in a technical sense) capital base of any nation in the world".(10) This is due in large part to insufficient and mis-directed research and development:

> Federal R & D focuses two-thirds of its efforts on defense and space-related studies, whereas Japan commits less than 10 percent of its efforts in these two sectors. U.S. industry committments to basic research have dropped since 1967 and in 1976 had dropped (constant dollars) to the level of committments made in 1960. The U.S. reinvestment of new capital into R & D is low, whether measured by history or by international comparison.(11)

Critics have maintained that we in the U.S. should spend more effort "rediscovering and reorganizing existing technical knowledge". (12) The DOE Office of Industrial Programs does exactly this: it demonstrates, through cost-shared projects with industry, promising but risky energy saving systems, and it provides information to help small businesses conserve.

Praise For the Office of Industrial Programs

DOE's industrial programs have been widely praised. The principal finding of a National Academy of Sciences assessment of the DOE Office of Industrial Programs was that:

> On balance, the Office of Industrial Programs has done a commendable job in implementing the federal role in industrial energy conservation that was established by Congress and it has spent the monies appropriated to it in a prudent manner, as evidenced by the results of its efforts to date and those projects that appear to have future potential. (13)

The NAS went on to say "The committee believes that federal support of the present and planned DOE industrial energy conservation program is an important effort to achieve additional energy conservation". (13) The NAS arrived at this conclusion on the basis of several OIP successes, including:

1. Demonstration of a system by OIP to use fumes to heat paint curing ovens led to the commercialization of the technology and sales of 20 units, resulting in over $13 million of energy savings.
2. A foam-finishing process (using foam to replace water in textile finishing operations) is now being used in 18 textile mills and has saved close to $12 million in energy costs.
3. Eight completed projects today save more than $60 million per year in energy costs--more than OIP's total annual budget.
4. Other projects successfully completed and saving energy include conversion of waste polypropylene to fuel oil, waste heat recuperators, reactors for fertilizer production, and a biomass fueled corn dryer. (13)

Similarly, DOE's Energy Research Advisory Board (ERAB) concluded that:

> Industrial Conservation valued in the high category when compared to all other DOE R & D programs...(we recommend) that this program be restored close to 1981 funding levels. (14)

The ERAB based these recommendations on the observation that:

> ...many of the industrial conservation projects previously undertaken by DOE have been highly effective and have included cost recovery techniques for the government. Continuity and continued skilled management are important features in the prior (and future) success fo this R & D component. (14)

The U.S. Congress Office of Technology Assessment, in describing the success of the Energy Analysis and Diagnostic Centers (EADC's), which are funded by DOE to provide technical assistance to small businesses for energy conservation, stated:

> DOE should expand its excellent EADC's to a full nationwide energy extension service... (15)

Such praise for a program of government intervention in industry is unusual. It reflects the expertise and quality of staff that OIP has been fortunate to have. Industries and their representatives to ERAB, OTA, and the NAS have consistently praised OIP's programs.

OIP's programs succeed because:

1. OIP seeks and uses industry leadership.
2. Projects are not undertaken unless they save in dollar value 10 times as much in energy as the project costs DOE.
3. OIP is well managed. The Energy Analyis and Diagnostic Centers, for example, were capable of persuading industrial management to take 56 % of the actions recommended to them.

Table 2 shows how valuable to the country OIP could be: its industrial energy conservation efforts could save 1.5 quads by 1985, and 5.5 quads by the year 2000.

Tax Incentives For Industrial Energy Conservation

Financial incentives could accelerate the adoption of industrial energy conservation systems. Unfortunately, the 10 % investment tax credit for investments in industrial energy conservation expires December 31, 1982. The tax law changes in 1981 not only did not reduce the already outrageous bias in the tax code for energy production and consumption, they made this bias worse. Tax expenditures for promoting energy supply totalled at least 7 times as much as for conservation, and more than a quarter of the tax benefits extended to industry in the Economic Recovery Tax Act of 1981 will go to energy supply investments. A vastly smaller portion will go to energy conservation investments. See Tables 4 and 5.

The industrial energy conservation investment tax credit, if extended and expanded, could help offset this bias by a small amount. More importantly, it would spur conservation in industry by:

1. Encouraging third-party financing for industrial cogeneration.
2. Increasing cash-flow for corporations strapped for cash. Cash-is frequently a major investment constraint.
3. Accelerating the retrofitting of existing industries, especially in the Midwest and Northeast. Half of all existing industrial equipment is expected to be still in use in the year 2000. (16)

To a large degree, revenue losses from extending and expanding this tax credit would be offset by resulting reductions in industry deductions for energy consumption expenses. And relative to defense spending, fiscal investments in energy security are much sounder than schemes to "take" or somehow "protect" Mideast oil in the event of upheaval around the Persian Gulf.

The Buildings Sector

The DOE Budget

The DOE conservation budget makes a substantial contribution in the buildings sector. The national laboratories, for example, are doing unique research using DOE funds. This important work includes: research on how to label buildings and appliances for efficiency, on how to make insulation safe, on indoor air pollution, whether the Residential Conservation Service works, and so on. These efforts have received critical funding and deserve continued support from the government.

Perhaps the single most important item in the entire budget is low income weatherization assistance. The $144 million appropriated last year for this purpose was a pitiful sum--it would take 100 years to insulate lower income homes at this rate. We should be spending 20 times as much. (17)

Conclusion

Federal government conseration efforts should be continued--at higher levels of funding. And they should be supplemented. We need new measures to spur automobile and heavy truck fuel economy; we need mandatory labeling of tires and other energy consuming products for fuel efficiency; we need expanded tax incentives for industrial enrgy conservation; and we need to get serious about weatherizing the homes of the poor.

We have every reason to take these energy conservation measures: national security, equity, economic health; environmental protection, and others. We ignore them at our peril.

TABLE 1

Energy Conservation Budget Checklist
(Millions of Dollars)

Program	1982 Appropriation	Reagan 1983 Budget	Comment
Auto Fuel Economy Standards Certification (EPA)	(30 - 40 % cuts since 1981)		Prevents cheating on CAFE Standards
Tire Testing for Fuel Economy (EPA)	$ .1	$ 0	Provides info to help market work
Gas Mileage Guide	1	0	Provides info to help market work
Electric and Alternate Auto Engines Research (DOE)	58	-	Needs redirection
Mass Transit (DOT)	3,500	3,200	Operating Assistar to be eliminated by 1985.
Industrial Sector Research, Demonstration, Information	29	- -	Information valua
Weatherization Assistance	144	-	Essential
Schools and Hospitals Grants	48	-	To retrofit 2000 schools or hospit
Research/Standards Development in Buildings Sector	48	-	Important.
Solar and Energy Conservation Bank (HUD)	23	0	
TOTAL DOE	386	22	

TABLE 2

Background On Rating of Tire Fuel Efficiency

54 brand-name tires ranked for efficiency

WASHINGTON. — A ranking of 54 brand-name tires by their fuel efficiency has been made by the Environmental Policy Institute.

It was done by William U. Chandler for EPI, using data acquired under a Freedom of Information request to EPA, which measured the rolling resistance of 106 passenger-car tires. EPA's technical report is dated August, 1981.

EPI's analysis of the EPA tests reveal that a consumer's choice of replacement tires can save him — or cost him — as much as $60 per year in gasoline. Put another way, his choice can save him — over the life of the tires — enough to completely pay for two to three tires.

Fuel efficiency, says EPI, bears no direct relationship to price, safety or tread wear. Tires should be labeled for fuel efficiency, Chandler concludes, as well as for the three requirements under Uniform Tire Quality Grading.

Although Chandler and EPI are making the case primarily for the best consumer choice in replacement tires, the point could also be made for vehicle makers equipping their tires not only with radials — admittedly the ones with the least rolling resistance, hence most fuel efficiency — but with the particular radials with the greatest efficiency.

The OE tires — more than 90 percent radials — have much higher efficiency than replacement tires since only six out of 10 buy radials as replacements. But gasoline savings could be even higher if vehicle makers chose only the most efficient radials and a single informational program — perhaps with advertising — could get the aftermarket to follow.

Chandler figures the cost for mandatory labeling for fuel efficiency of tires would be modest — perhaps only $25,000 per company using EPA's test procedures. The government's role would be only random sampling to "assure compliance and prevent cheating."

Using letter grades — perhaps A through F — would make the program comprehensible to buyers.

EPI's analysis of the EPA data shows the manufacturers (or marketers) having the highest average fuel efficiency ratings are Goodyear, Michelin, Delta, Uniroyal and Montgomery Ward. (EPA, like NHTSA, uses marketers as manufacturers of record even though some of these are private brands of tire makers.) But, Chandler warns, buying one of these brands does not necessarily mean the consumer will be getting an efficient tire. (One of Montgomery Ward's tires is 32nd on the list and the maker of the second most efficient tire — B.F. Goodrich — is not even on the list of five.)

- Instead, EPI lists the ten most fuel efficient tires by using EPA's rolling resistance numbers and converting a set of four with its price into annual savings and showing the MPG improvement for a 25-MPG car.

The winners are:

Goodyear Arriva — $62.60 annual savings — 2.9-MPG gain.

B.F. Goodrich Lifesaver XLM — $57.40 annual savings — 2.7-MPG gain.

Goodyear Viva — $56.40 annual savings — 2.6-MPG gain.

Sears Guardsman (Armstrong) — $56.10 annual savings — 2.4-MPG gain.

Firestone Deluxe Champion Radial — $49.20 annual savings — 2.3-MPG gain.

Uniroyal Royal Seal — $47.10 annual savings — 2.2-MPG gain.

Delta Sierra GBR (Armstrong) — $45.00 annual savings — 2.1-MPG gain.

Discount Arizonian (Goodrich) — $45.00 annual savings— 2.1-MPG gain.

Montgomery Ward Gas Miser (Firestone) — $45.00 annual savings — 2.1-MPG gain.

Michelin XZX — $43.90 annual savings — 2.0-MPG gain.

The annual savings are relative to the least efficient bias ply tire. The improvement in fuel economy also strongly depends on the fuel economy of the car used and the estimate is used for reference only. But the annual savings apply to the average U. S. auto.

AUTOMOTIVE NEWS
September 21, 1981 P 3

TABLE 3. ESTIMATED ENERGY SAVINGS DUE TO DOE'S OFFICE OF INDUSTRIAL PROGRAMS

Sub-Program	Annual Energy Savings (Quadrillion Btu)	
	1985	2000
Waste Energy Reduction	.75	2.30
Industrial Cogeneration	.25	1.00
Industrial Process Efficiency	.50	2.20
Technology Deployment and Monitoring	--	--
TOTAL	1.50	5.50

Source: U.S. Department of Energy

TABLE 4

Energy Tax Expenditures, 1981

Conservation	$785,000,000
Supply	6,020,000.000

Source: Congressional Budget Office

TABLE 5

Estimated Share of Benefits From The Economic Recovery Tax Act

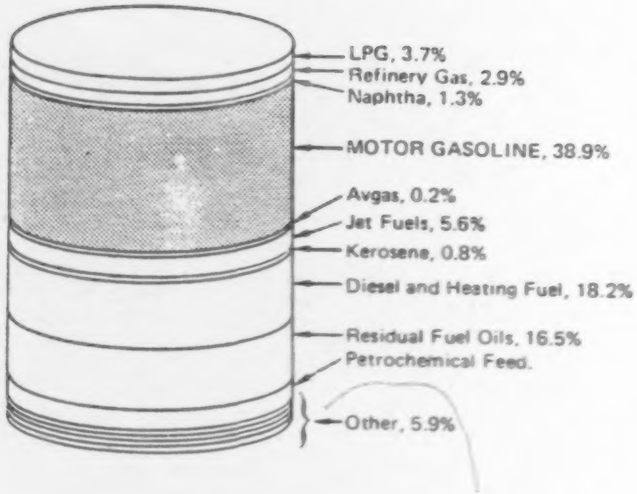
Industry	Percent of Total Industry Benefits
Electric Utilities	10.6
Telecommunications	8.8
Petroleum Refining	6.2
Trade	5.9
Agriculture	5.7
Oil and Gas Production	5.5
Chemicals	5.3
Machinery	5.4
Mining	3.7
Motor Vehicle Production	3.5
Gas Utilities	3.1
Construction	3.0
Airlines	2.7
Oil and Gas Pipelines	1.8
TOTAL, ENERGY PRODUCERS	27.2
TOTAL, Manufacturing	33.5*

*Note that only a small portion of manufacturing investment could be counted as energy conservation investment. Incentives for manufacturing investment are, in general, not incentives that may be counted for conservation.

Source: Joint Economic Committee, U.S. Congress

FIGURE 1

PRODUCTS DERIVED FROM A BARREL OF OIL



REFERENCES

(1) James Cook, Forbes, May 15, 1982.

(2) Daniel Yergin, Presentation to the Ninth Annual Congressional Forum, National Capital Area League of Women Voters, March 25, 1981.

(3) Philip Garon, U.S. Department of Energy, quoted in "Public Interest Report", Journal of the Federation of American Scientists, Volume 34, No. 9, November, 1981, Washington, D.C.

(4) Eric Hirst, et al, "Energy Use From 1973 to 1980: The Role of Improved Energy Efficiency", Oak Ridge National Laboratory, ORNL/CON-79.

(5) Monthly Energy Review, U.S. Department Of Energy.

(6) W. Kenneth Davis, Deputy Secretary of Energy, Statement before the Annual Meeting, The Alliance to Save Energy, Washington, D.C., March 12, 1982.

(7) John H. Gibbons and William U. Chandler, ENERGY: The Conservation Revolution, Plenum Press, New York, 1981.

(8) The Energy Policy and Conservation Act of 1975 (42 U.S.S. 6341).

(9) William U. Chandler, "The Fuel Efficiency of Tires By Manufacturer and Model", Environmental Policy Institute, Washington, D.C., September, 1981.

(10) Robert O. Reid and Melvin H. Chiogioji, "Technological Options for Improving Energy Efficiency In Industry and Agriculture", in Energy Conservation and Public Policy, John C. Sawhill, editor, Prentice-Hall, Englewood Cliffs, New Jersey, 1979.

(11) John H. Gibbons, "Long Term Research Opportunities", in Sawhill, Ref. 10.

(12) Marc Ross and Robert H. Williams, Our Energy: Regaining Control, McGraw-Hill, Chicago, 1981.

(13) "An Assessment of the Industrial Energy Conservation Program", Vol. 1, Summary, National Materials Advisory Board, Commission on Sociotechnical Systems, National Academy of Sciences, September, 1981.

(14) "Federal Energy R&D Priorities", Report of the Research and Development of the Energy Research Advisory Board, November, 1981.

(15) "Conservation and Solar Energy Programs of the Department of Energy: A Critique", U.S. Congress Office of Technology Assessment, June, 1980.

(16) H.L. Gwin, "Industrial Energy Conservation: Potential and Costs", Environmental Policy Institute, Washington, D.C., January, 1981.

(17) Norris McDonald, "Energy Efficiency Strategies for Multifamily Rental Housing", Environmental Policy Institute, September, 1981.

(18) "Proposed Depreciation and Investment Tax Credit Revisions", Part II, Present Law and Description of Proposals, Staff of the Joint Committee On Taxation, U.S. Congress, May 18, 1981.

COMMUNITY ACTION
PEOPLE HELPING PEOPLE

OREGON COMMUNITY ACTION PROGRAMS
EXECUTIVE DIRECTOR'S ASSOCIATION

April 16, 1982

Mr. Gary Barbour
Senator Hatfield's Office
463 Russell Senate Office Building
Washington, D.C.

Dear Gary,

It is our hope that the enclosed statement may be included in the testimony for the US Senate Committee on Energy & Natural Resources hearing on USDOE's Energy Conservation Programs held March 30, 1982.

We appreciate your assistance in this matter; we firmly believe in the value of low income weatherization programs and would do all that is possible to support their continuation.

Sincerely,

Heather A. Hennessey
Ms. Heather A. Hennessey
Administrative Officer

1270 Chemeketa St. NE
Salem, Oregon 97301
(503) 399-0379

Statement of Oregon Community Action Agencies Directors' Association

Submitted by Heather A. Hennessey
Administrative Officer
Oregon Community Action Agencies Directors' Association
1270 Chemeketa St. NE
Salem, Oregon 97301

Hearing on Department of Energy Conservation Programs

US Senate Committee on Energy & Natural Resources

March 30, 1982

Weatherization in Oregon for Low Income Residents

Since 1977 the US Department of Energy has provided funds to weatherize homes of low income Oregonians. The goal of this program has been to make these homes more energy efficient and permanently reduce their energy consumption.

Low income Oregon residents form a very diverse group. They are spread through all 36 urban and rural counties in single family, multi-family and mobile dwellings. The low income consumers range from seasonally employed to recently unemployed to a large number of fixed income elderly homeowners. Their relationship with utility companies is not a positive, trusting, mutually supportive one. They have no disposable income to repay even a "no interest" loan, nor are the elderly willing to accept a lien on their homes. Tax credit incentives are meaningless for those on poverty level incomes.

The result is that approximately 120,000 low income Oregon homes have remained unserved by utility efforts and many are grossly energy inefficient. Poor consumers present a unique conservation opportunity and challenge.

In the seven years that Oregon has been operating the low income weatherization program over 20,000 homes have received conservation services. The current production capability of Oregon Wx teams exceeds 5,000 low income homes per year when financial resources are available. With the experience gained from 20,000 completions, program operators have developed performance standards for materials and workmanship that consistently provide cost effective services.

All studies conducted on homes weatherized in Oregon show reductions in consumption of energy by 20 to 25%. By utilizing mass purchases of equipment & materials, and planning joint training projects, Oregon has held weatherization costs to an average of $786.00 per unit.

The costs incurred at all levels, state and local, for low income weatherization remain at or below the comparable costs of employing private contractors.

There were 22 low income weatherization subgrantees operating in Oregon in June, 1981. Each has the capacity of a small construction firm with trained staff, inventory controls, efficient fiscal systems and appropriate equipment. Half of the weatheriazation subgrantees are Oregon Community Action Agencies. All the programs serve low income Oregonians and work together through the Oregon Energy Coordinators Association. The result is an in-place weatherization network of trained, dedicated people throughout Oregon.

Oregon CAP Directors encourage your support for USDOE's Weatherization Program; it has proven itself many times over.

○